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THE AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS

Report of Its Successful Session at Niagara Falls – Standard Rattler Recommended – Five-Year Paving Guarantee Favored —Merits of Portland and Natural Cements Discussed—Favorable Comments on Wooden Pavement—Officers Elected—Next Meeting at Rochester

THE representation at the eighth annual meeting of this well-known organization was equal to that of previous years. While its membership is not as great as some others, its work is none the less important. The delegates were intensely interested. It is not a "junketing," but a working society. In standing committees it keeps at it all the year around, not confining its efforts for civic betterment to the short session of the annual gathering.

In his annual address, President R. E. McMath reviewed the work of the society for the past seven years, showing the good it has accomplished, not only by conventions but constant intercourse between its members. He showed that the 133 papers and reports, not including those of this meeting, printed in the seven annual publications of the society, were of great value for study and reference. They are classified by subjects, as follows: Paving, 41; lighting, 7; sewers and sanitation, 18; water works, 17; taxation and assessment, 8; city government and legislature, 5; garbage, 14; franchises, 1; review of progress of public works, 3; statistics, 4; parks, 4; water pipe coating, 4; electrolysis, 6; grade crossings, 1.

While not advocating a complete union with the League of American Municipalities Mr. McMath strongly advised co-operation between the two, at least in uniting at annual conventions and affiliations in other ways.

STANDARD RATTLER RECOMMENDED

The committee on specifications for brick paving submitted a partial report, recommending a standard rattler, as follows: Polygonal cylinder, fourteen plane staves spaced one-quarter of an inch apart at edges; interior free from projections; internal diameter twenty-eight inches and twenty inches long.

Standard shot: Mixture of two sizes of shot; large, two and one-half inches square and four and one-half inches long; weight, about seven and one-half pounds. Smaller, one and one-half inches on each side and weight about seven-eighths of a pound; all of machine cast iron. Corners, rounded one-quarter of an inch radius. New shot shall be used where old have lost one-tenth its weight. Charge shall be seventy-five pounds large shot and 225 pounds small shot.

Number and condition of brick: Use twelve paving bricks or nine paving blocks for a single test, but two more or less can be used. Bricks are to be dried before testing.

The test: Rotate rattler twenty-eight to thirty revolutions per minute and 1,800 revolutions.

The results: The percentage shall be in percentages of original weight of dry brick of the charge. In weighing the result of the rattler test, pieces of brick less than one-half of a pound shall be rejected. Tests shall be made in duplicate and an average taken.

Variation in size of rattlers: Rattlers greater than twenty-eight inches diameter and twenty inches length may be used, the charge of shot to be increased in proportion. This will give a slightly different result for the standard size.

The committee advises that other methods can still be used, but recommends the above standard for rattler tests.

STREET PAVING REPORT

The committee on street paving made its report through its chairman, Mr. G. W. Tillson, Assistant Engineer, Department of Highways, Brooklyn, N. Y. He dwelt especially upon the necessity of having the conditions of a pavement during its period of guarantee, or free maintenance, carefully defined, in the interest of the city and contractor also, as it often happens that a new official must examine and accept pavements laid under previous officials who have not clearly defined in exactly what condition the asphalt or other pavement shall be at all times, or by the end of the guarantee period. The committee recommended the uniform guarantee upon asphalt pavements of five years because, after that time, repairs and maintenance are due to wear. Five years are sufficient to bring out any defect in workmanship or material. Maintenance after five years should not be charged to original cost of pavement. A bond for five years and a retention of ten cents per square yard during the five years is thought wise. The examination of asphalt bids show that it cost about thirty-five cents per square yard more to get bids with ten-year guarantees compared with five years, which, when divided by five, shows that the asphalt companies charge at the rate of seven cents per square yard per year to maintain pavements from the fifth to the tenth year. It would be better for the city to have asphalt pavements laid with five-year guarantees and thus have some chance of benefiting by competition, or other expedient, so as to get the asphalt pavements maintained at less than seven cents per square yard per year. The committee advised a five-year guarantee of good condition for brick pavements. Such pavements to be delivered to the city in good condition at the end of five years. The security should be a bond and ten cents per square yard retained as for asphalt. In reference to granite and good cut stone block pavements the committee thinks that one year guarantee and ten cents per square yard retained is sufficient to secure good materials and workmanship.

In reference to wood the committee called attention to the amount of old-fashioned block pavements laid in Chicago and a few other western cities from 1880 to 1890 and their complete failure. Wood pavement, if used, must be laid with specially prepared blocks upon concrete foundations under careful supervision as in large European cities and as in Boston, Indianapolis and Chicago, where some improved wood pavement has been tried with satisfactory results. The

demand for asphalt pavement is good. Specifications for it are more and more complete each year. The committee called attention to the use of asphalt in New York and elsewhere under very heavy traffic, where it is attracting much attention on the part of city officials.

RELATIVE MERITS OF PORTLAND AND NATURAL CEMENTS

Mr. C. H. Rust, City Engineer of Toronto, Canada, read the report of the committee on the relative merits of Portland and natural cements. It referred more particularly to practice in Canada, although much that he said applied to the United States. He showed that the former general use of natural cements is being superseded by Portland cements because the American Portland cements are becoming better and cheaper than they formerly were. The Canada natural cements are very inferior. Portland is so much better there that it is almost as cheap and far safer to use it. Toronto requires for concrete foundation for pavements a mixture of 1, 2 and 5 parts of natural cement, sand and crushed stone, but for Portland of ordinary grade a mixture of 1, 3 and 6. He showed that many natural cements of the United States are so good that their use is fully warranted for pavement foundations. Of forty-three cities which he examined, twenty-eight used only natural cement and fifteen allowed both.

In Toronto the cost of natural cement concrete is about $3.88 per cubic yard in place on the street, and of Portland concrete, sometimes as high as $5.66. Natural cement there costs 50 to 85 cents per barrel and Portland $1.30 to $2.50. The consumption of cement in the United States at different periods was as follows:

Natural in 1890.....7,082,000 barrels
" " 1896 .....7,970,000 "
Increase of 12½% in six years.
Portland, 1890 .....2,275,000 barrels
" 1896 .....4,532,000 "
Increase of 100% in six years.

This was for all kinds of engineering work not in pavement foundations alone.

The use of sand or silica cement is not good for pavement foundations as experience in Toronto indicated. Climate is a factor in the use of Portland cements which is an advantage in Canada, where work must often be done in cold weather. Much discussion followed, the general feeling being that natural cements, when meeting reasonable requirements and tests, are excellent for paving foundations; that many natural cements become very cheap and very poor. Except for certain places and reasonable prices there is no need of seeking Portland cements for pavement foundations.

FAVORABLE COMMENTS ON WOOD PAVEMENTS

Mr. F. A. Kummer of the United States Wood Preserving Company, New York, read a paper upon wood pavements. He clearly showed that, as heretofore laid in the United States, they were a failure because of lack of foundation, poor construction and the use of wood improperly treated. He showed the conditions of the prepared blocks properly laid by his company and set forth the merits of successful wood pavements in Europe. He gave statistics demonstrating the economy under certain traffic of well laid wood black pavements.

Mr. Lewis, of Brooklyn, stated that good wood pavement will be welcomed as a competitor with asphalt pavement in order to help keep prices down and compel both to be well laid. He suggested that wood pavement be not laid on grades steeper than four per cent., and called attention to the fact that the blocks must be cut with great precision.

F. V. E. Bardol, Chief Engineer of Buffalo, stated that his prejudices against wood pavement were becoming less.

Other valuable papers were read and discussed during this session, which are given in full in this issue, or will appear in subsequent numbers.

OFFICERS ELECTED

The resignation of Mr. D. L. Fulton, who has been the secretary of the organization since its inception, was accepted with regret. His growing responsibilities as the Superintendent of Parks and Sewers of Allegheny would prevent his retention of the office.

The officers elected to serve the ensuing year are as follows:

President—Edwin A. Fisher, City Engineer, Rochester, N. Y.

First Vice-President—Charles H. Rust, City Engineer, Toronto, Canada.

Second Vice-President—George M. Ballard, member Board of Works, Newark, N. J.

Third Vice-President—Charles C. Brown, editor *Municipal Engineering*, Indianapolis, Ind.

Secretary—Geo. W. Tillson, Assistant Engineer, Brooklyn, N. Y.

Treasurer—F. J. O'Brien, Street Commissioner, Oswego, N. Y.

Finance Committee—W. B. Howe, City Engineer, Concord, N. H.; B. J. Ashley, Consulting Engineer, Chicago, Ill.; Edwin D. Very, City Engineer, Niagara Falls, N. Y.

The place of meeting in 1902 is to be Rochester, N. Y., and in 1903, probably St. Louis, Mo., when the society hopes to unite with other societies having a direct or indirect interest in the betterment of cities and of citizens, upon same date for a general convention of all.

ASPHALTUM AND ITS COMPOUNDS IN NATURE

Millions Invested in the Industry—Principal Use for Pavements—Used for Thousands of Years—Location of the World's Best Deposits—Valuable Comparative Tables

By J. W. Howard, B. L., C. E*

THE importance of asphaltum and its compounds can be realized when we consider the amount of capital invested, the number of men employed, the value and usefulness of the products.

The total world capital invested in the ownership of deposits of asphaltum and its natural compounds, mining, shipping, refining and preparing it and its products exceeds $42,000,000.

The number of men employed annually is now about 8,400.

The gross annual value of products which enter into many branches of engineering, architecture and manufactures for the past ten years has been about $7,000,000.

The profits, except in times of general financial depression, competition or local struggle for control of one or more sources of supply, have been excellent.

There have been several small and a few large financial failures in Europe during the nineteenth century and a few small ones in America connected with asphaltum industries, due to mismanagement, overcapitalization, or the attempt to use poor materials, or improperly apply good ones.

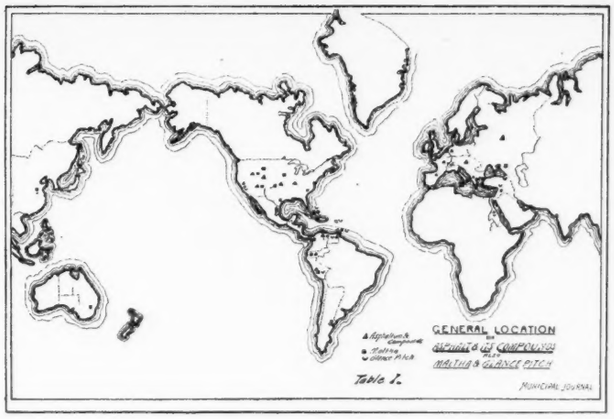
VAST SUMS INVESTED IN ASPHALT PAVEMENTS

It is well to remember that street paving, which is the branch of the asphalt industry best known to municipal engineers and officials, is but one of the many industries using asphaltum, asphalt-rock and similar materials. I can here say that the various kinds of asphalt pavements, now in use, represent an investment of city funds on city streets of the world as follows:

In Europe, in thirty-one years, beginning in 1869.....	$21,000,000
In America, in twenty-four years, beginning in 1896....	95,000,000
Total, including 1900.....	$116,000,000

The usefulness of the substance we are considering is evident from its constant mention in history, beginning in Genesis and other places in the Bible; then about 526 B. C. by Greek authors in descriptions of pitching boats and making varnish with asphaltum and oil. Herodotus and Diodorus describe its use as a cement in the

* Engineering Editor of the MUNICIPAL JOURNAL AND ENGINEER, who read this paper before the American Society of Municipal Improvements, at its eighth annual session, held at Niagara Falls, N. Y., Oct. 1-4, 1901.



Walls of Babylon. Pliny, Virgil, Curtius, Ovid and others mention it in various connections.

USED IN VARIOUS WAYS FOR MANY CENTURIES

The use of asphaltum developed as the arts and manufactures developed. It was used in the Greek fire of the Middle Ages. It was melted and poured burning upon the heads of attacking knights during the Crusades when under the walls of Oriental cities. It is the basis of what we now call patent leather, but known three hundred years ago as glance or polished leather.

In later times I find asphaltum described in a small book published in 1626 and called *hartz erde* (pitch earth); again, in a pamphlet by Amiest in 1692 and by Erynis in 1711. Since 1802, when the asphalt-rock deposits of France were discovered, the records have been continuous. In 1832 the first asphalt trust was undertaken, when Count de Sassenay united the interests of the asphalt-rock deposits of France and Switzerland.

Sidewalks were begun in Paris and the successful use of the material for roadways was made by Merian and later developed and perfected by Malo, whom I have several times met in France. Although an old man he gave me close attention and much information on this subject which has interested me for many years. Monsieur Malo and his associates paved Bergere street, in Paris, in 1854, which was the first real success under city traffic. The pavement soon spread to other European cities. The European companies have not used nor approved the artificial mixtures of asphaltum, such as that from Trinidad, with sand, etc., for street pavement, confining similar mixtures to sidewalks. The European cities, except certain trials of the artificial mixtures which were made there and failed and which are now being repeated, use for street pavements asphalt-rock only.

ASPHALT DEPOSITS IN THE UNITED STATES

There are similar or equivalent deposits of asphalt-rock in the United States. I presume the invested interests in other kinds of asphaltic materials, plants, patents, etc., prevent the largest asphalt company of our country, which endeavors to control directly or indirectly almost all the asphalt paving here, from developing the very promising asphalt-rock found in a few large deposits in Kentucky and elsewhere. The time will come when one or two of the Kentucky natural rock-asphalt deposits, if in the hands of good managers, with ample capital, helped by proper technical knowledge and experience, will supply one of the best pavements, especially in the growing cities within easy reach by railroad, from that inexhaustible supply.

The history of asphalt paving in the United States is that of the growth of a large and successful enterprise. Because of the expense of bringing asphalt-rock from Europe, none at that time being known to exist here, experiments were made by Mr. Frederick de Smedt in Newark, N. J., in 1871 and later elsewhere. The final result of this and other trials was a mixture of asphaltum softened with residuum oil, sand and limestone.

This composition pavement is sometimes cheaper, but not as durable as good asphalt-rock pavements; but being easier and cheaper to repair, it is usually cheap in the end, except under heavy traffic where the asphalt rock is more durable and cheaper to maintain. For most cities it is a question of freight charges, because, while the whole pavement surface must come from a distance if of asphalt rock, only about 15 or 20 per cent. comes a long distance, where local sand is cemented together by the asphaltic cement of artificial mixtures; the asphaltum, oil and possibly limestone only coming from a distant point.

POPULARITY OF ASPHALT PAVEMENT IN UNITED STATES

For the past twenty-five years, since 1876, the amount of asphalt pavements in the United States has increased to about 40,000,000 square yards, the equivalent of about 2,600 miles.

The result is handsomer, cleaner, quieter streets. Other pavements are better laid, on concrete foundations and evener surfaces, as a result of a desire to hold their own against asphalt.

The usefulness of asphaltum and its compounds appears in many other works than pavements. We find large reservoirs lined with it, foundations made waterproof, and other uses which I will mention later.

No one asphalt is suited to all uses, nor are all asphalts suited to the same uses. They must be selected and used as experience and the object desired dictates.

A few brief definitions will help to a clearer understanding of the accompanying map and tables. It is not necessary, in an outline of the subject I am trying to present, to go into details of geology, mineralogy, extreme chemical analyses and extended physical tests. These are interesting and necessary at their proper time and place when using these materials.

PLACE OF ASPHALT AMONG HYDROCARBONS

In order to locate asphaltum and its natural compounds in their proper place among the hydrocarbons, all that is necessary is to remind you that asphaltum is one of the bitumens. This is briefly shown in the second column of Table No. 2, where certain bitumens appear, arranged according to their density or other characteristics. I will omit further mention of natural gas, natural naphtha, petroleum, elaterite and ozocerite, and proceed with maltha, asphaltum and glance pitch.

Maltha, from the Greek maltha, is a soft, black, natural mineral pitch which is very little altered by long exposure to the weather. It flows slowly, like thick molasses. It can be dissolved in carbon disulphide. It is denser and thicker than crude petroleum, with which it is associated in a few localities. It is softer than asphaltum, with which it sometimes occurs. It varies greatly and certain standard specific gravity, flowing, evaporating, purity and other tests are necessary to select it for different uses. It is found in springs of various grades and purity. It occurs, also, saturating large bodies of mineral matter, especially sand. A few crude petroleums have what is termed an asphalt or maltha base; so that when the lighter oils are removed by distillation, etc., that which remains is regarded as a maltha, called also liquid asphalt. Leaving out the problem of economy, most malthas can be reduced by refining, etc., to the standards desired.

There is, however, a scarcity of good, cheap maltha. Therefore the use of residuum oil, obtained from petroleum with so-called paraffine base, is continued in connection with paving and other industries.

Table 2 — CHARACTER & LOCATION OF NATURAL BITUMENS & COMPOUNDS

	BITUMEN	CHARACTER	WHERE FOUND
Important Bitumens & Compounds	Natural Gas	Gaseous	North America, South America, Europe, Asia
	Natural Naptha	Thin Fluid	North America, South America, Europe
	Petroleum	Thick, Oily	North America, South America, Europe, Asia
	Maltha & Compounds	Soft at 77° F. called also "Soft asphalt"	North America, South America, Europe, Asia, Africa, Australia
	Asphaltum & Compounds	Stiff at 77° F. Hard mineral pitch	North America, South America, Asia, Africa
	Glance Pitch	Brittle at 77° F. "Mineral pitch"	North America, South America, Asia, Africa
	Elaterite	Elastic, "Mineral Rubber"	North America, South America, Europe, Asia
	Ozocerite	"Mineral Wax"	North America, Europe, Asia
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Table 3 — CLASSIFICATION & LOCATION OF ASPHALTUM & COMPOUNDS

ASPHALTUM		ASPHALT-ROCK	
PURE – NEARLY PURE (with small percent of mineral & organic matter)	COMPOUNDED WITH EARTHY MATTER (large percent of silicate, alumina, infusoria etc. also small percent of organic matter	COMPOUNDED WITH LIMESTONE (containing silicates etc)	COMPOUNDED WITH SANDSTONE (containing carbonates of lime etc)
Mexico United States Venezuela	Colombia Cuba Equador Mexico Peru Trinidad United States Venezuela	Austria Cuba France Germany Hungary Italy Russia Sicily Spain Switzerland Turkey United States	France Germany Italy Russia Sicily Spain Turkey United States

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WHAT ASPHALT IS

Asphaltum, from the Greek asphaltos, is a stiff, natural mineral pitch, very slightly affected by many years' exposure to the sun and weather. When pure or nearly pure it is very dark brown, but generally black. A small piece warmed in the hand can be bent. When struck at usual temperatures it breaks easily. Its fracture is shell-like. It is sectile, and when rubbed or heated emits a peculiar, pleasant odor. It is soluble in carbondisulphide. When pure it softens and flows at about the temperature of boiling water and becomes liquid at a little higher heat. It must not be confounded with gas-tar or coal-tar or the by-product or coke from petroleum.

Crude asphaltum occurs in all degrees of purity and often varies in the same deposit, hence the importance of careful refining to definite standards according to the object desired. Many tests are applied, such as specific gravity, softening and flowing at given temperatures, solubility in standard solvents, loss under protracted heating at fixed temperatures. While in a technical discussion we use the word asphaltum, in common conversation the simple word asphalt suffices.

DIFFERENCE BETWEEN ROCK AND PITCH ASPHALT

Asphalt rock is a natural rock composed principally of limestone or sandstone, thoroughly impregnated with asphaltum. Its color is from light chocolate to black. Alumina, magnesium carbonate and a few other minerals in small quantities are sometimes present. The per cent. of asphaltum in the rock varies from very small to very large; but in this case the more does not mean the better, for we seek asphalt-rock with a moderate per cent. of asphaltum in it. Such asphalt rock is found in Southern Texas, a few places in Kentucky and elsewhere.

All asphalt rock is not good for paving. Much of it cannot be used for this purpose except with rather poor results, as that laid at San Francisco with a soft material.

Glance pitch is a hard, black, brittle and friable mineral pitch, of the consistency of rosin. A small piece in the hand can be powdered with the fingers. Its fracture is shell-shaped. It softens and melts at a higher temperature than asphaltum. It should not be used in any way in pavements as it has little or no cementing qualities at ordinary temperatures. It is very valuable for many other purposes, such as varnishes and paints. It bears many names in commerce such as unitahite, grahamite, manjak, Syrian asphalt and in the varnish trade it is called asphaltum or asphaltum-gum.

Table 2 — ANALYSES OF CRUDE ASPHALTUM FROM VARIOUS DEPOSITS

	California	Cuba	Mexico	Peru	Trinidad	Venezuela
Asphaltum	38 - 85	24 - 68	35 - 94	85 - 96	35 - 40	45 - 95
Mineral Matter	60 - 8	73 - 26	55 - 4	9 - 2	41 - 24	40 - 2
Organic Matter	0 - 1	2 - 1	8 - 2	4 - 1	10 - 4	7 - 1
Water	2 - 6	1 - 5	2 - 0	2 - 1	14 - 30	8 - 2
	100 100	100 100	100 100	100 100	100 100	100 100

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LOCATION OF DEPOSITS

The general location of the known deposits of asphaltum and its compounds, to which I have added maltha and glance pitch, are shown on the map of the world marked Table No. 1. Asphaltum and its compounds, including asphalt rock, are shown by pyramids; maltha by squares; glance pitch by half-moons.

In the course of my study and professional work during the past twenty years, I have had occasion to examine a large number of these deposits and obtain in person or through others, samples and data from them all. When I first took up the subject of asphaltum some years ago, I did so because it was a field not occupied except by a few and they principally French and German. What few books and records existed were at that time in French, German and a little in Italian and English.

The map and tables which I present are an attempt to set forth some of the results of my experience in connection with mining and using these materials and study connected therewith.

Cities using asphalt pavements should put the specifications on a more scientific and strictly engineering basis, as has been done with water works, sewers and other public work. Portland and other hydraulic cements were formerly purchased or permitted to be used in city work on the reputation of a brand or through influence, political or otherwise. Now most cities require the cements to meet certain well defined tests without regard to brands or private mark. The time has arrived when all private, commercial, or local names of asphalts should be removed from the specifications. There should be no reference to origin of supply nor to crude asphalt.

Table 4 — CLASSIFICATION & LOCATION OF MALTHA & COMPOUNDS

Table 5 — GLANCE PITCH

PURE – NEARLY PURE (With small percent of mineral & organic matter)	COMPOUNDED WITH EARTHY MATTER (Large percent of silicates, alumina etc)	COMPOUNDED WITH SANDSTONE, SAND ETC	PURE – NEARLY PURE	COMPOUNDED (With large percent of silicates, alumina, etc)
Argentine Cuba Equador Honduras Mexico Russia Syria Trinidad Turkey United States Venezuela	Argentine Colombia Cuba Egypt Equador France Germany Honduras Mexico Peru Russia Syria Trinidad Turkey United States Venezuela	Argentine Australia Cuba Mexico Russia Syria Turkey United States Venezuela	Argentine Barbadoes China Cuba Egypt Japan Mexico Syria Trinidad Turkey United States Venezuela	Argentine Barbadoes China Cuba Egypt Japan Mexico Peru Syria Trinidad Turkey United States Venezuela

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It is the refined asphalt which is used for compounding some pavements and natural asphalt rock for others. Upon these should be concentrated the technical requirements or standard tests as well as upon the other materials as presented for use.

Table No. 2 indicates the classification and general location of the mines of principal bitumens and their compounds.

Table No. 3 gives the general location of the deposits of asphaltum and compounds and is divided into two groups—asphaltum more or less pure and asphalt rock of two general kinds. You will note how widely distributed the deposits are; all the more so when we remember that there are often several deposits in each county or state.

Tables No. 4 and No. 5 show the same facts in reference to maltha and glance pitch; two substances so closely allied to asphaltum as to require a knowledge of them to assist or to safeguard the user.

ANALYSES

Without going into details, I present the results of simple analyses of asphalt and important compounds found in nature. The maximum and minimum of each component part is given, between which there are many variations in different deposits and often in the same deposit. Some of these have never before been made public. They are the results of my investigations and professional work since 1881.

Table 7 ANALYSES OF ASPHALT ROCK FROM VARIOUS DEPOSITS

	Kentucky	Indian Territory	Texas	Utah	California	France	Germany	Sicily	Spain	Switzerland
	various	various	various	various	various	Seyssel	Limmer	Ragusa	Val de Travers	
Asphaltum	4. - 10.70	3.0-12.30	3.11 - 11.65	4.34 - 36.28	4.47 - 29.40	8.15	14.30	8.92	8.80	10.15
Calcium Carbonate		0.0-80.00	20.30 - 0.03	8.02 - 29.52	0.0 - 3.10	91.30	4.700	88.21	9.15	88.40
Silica	35.43 - 89.30	96.30-4.45	0.0 - 88.32	82.87 - 4.44	89.73 - 45.44			0.60	68.75	
Alumina etc.		0.10 - 1.11	4.0 - 0.0	0.0 - 27.74	0.0 - 15.30	0.15	17.52	0.91	4.35	0.25
Magnesium Carbonate		0.0 - 1.86	0.3 - 0.0			0.10		0.96	8.10	0.30
Miscellaneous	0.37 - 0.0	0.0 - 0.30	0.28 - 0.0	2.77 - 0.0	3.80 - 0.0	0.10	0.0	0.0	0.40	0.45
Loss			0.01 - 0.0			0.20	1.18	0.40	0.45	0.45
	100 100	100 100	100 100	100 100	100 100	100	100	100	100	100

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They also include the analyses of a few German, French and American chemists who have given this matter attention.

Table No. 6 shows the analyses of crude asphaltum of commerce from several representative sources of supply and various deposits in each. It is apparent that the crude asphaltum varies even from the same general district. But it is usually possible to so refine and treat the crude asphaltum as to secure a desired result. The asphalt rock, however, must be selected at the deposit of the quality to be used for pavements. If it is to be used for other purposes additions can be made to it, but this is not often safe when using asphalt rock for pavements subjected to heavy traffic.

Some asphalt questions which come before city authorities to decide are artificial questions or differences secretly emanating from interested persons. I refer to such questions as the lake *versus* land asphalts, or artificial mixture *versus* natural asphalt rock. The safe and honest procedure is to have tests for quality fully stated in the specifications and see that they are enforced. When a city engineer or official has not the required expert detailed knowledge, nor can it be expected with his general duties, he can quickly and economically call to his assistance some qualified expert to assist in preparing the specifications and test the asphaltum, asphalt rock and other materials presented for use.

No one commercial asphalt should be used as a model for others. This is a lazy and inaccurate way, because each commercial product itself varies from time to time. Tests must be upon independent units based upon knowledge and experience.

Table 7 shows the analyses of representative asphalt rock deposits in many parts of the world. This table taken in connection with Table No. 6 shows that there would be no occasion of obtaining any of these materials from foreign countries, unless the expense of railroad freight made it more profitable to use water freight and foreign asphaltum than our excellent domestic products. The large and growing cities, especially in the middle and far west, will probably, in time, find it possible to use more of the selected materials from Kentucky, Utah and California, with better results than with those from Trinidad, Venezuela or elsewhere.

PRINCIPAL USES

In closing I will do no more than enumerate a few of the uses of the substances we are considering. They are used in civil, hydraulic, mechanical, sanitary, electrical and other branches of engineering. Asphaltum and its preparations enter into many parts of buildings from waterproofing the walls and covering the floors to finishing the roof. It is used in many manufactures and a few arts. It is used for paving streets, laying sidewalks, floors in warehouses, stables, breweries, hospitals, construction of cold storage establishments, excluding moisture from walls, lining reservoirs, vats and tanks, constructing powder magazines and other parts of fortifications, especially the parts underground, making waterproof felt and paper, cementing material for coal dust briquettes, asphalt concrete foundations for steam hammers, engines and dynamos where jarring in or near buildings must be suppressed, for certain paints and varnishes and coverings.

Asphaltum and its compounds furnish materials often needed; namely, those which are slightly elastic, tenacious, durable, not affected by slight deformation, jarring, nor by atmospheric temperatures and weather.

In order to use any substance which nature provides, we must study its physical and chemical properties. Then when occasion arises we know what to seek and how to apply it. Although the use of asphaltum and its compounds has increased enormously in the present generation, there is as yet too little reliable data available in technical books of reference, due to those engaged in the industry being too selfish or too busy to publish the needed data.

THE WATER METER AS A SANITARY AGENT

Not an Evil But a Friend—Gives Purer Water Supplies—A Particular Benefit to Small Towns and Cities—A Great Saver of Money Which Can Be Used for Other Purposes

By M. N. Baker*

THE value of the water meter as an aid in husbanding scanty water supplies, and postponing the day when additional pumps, larger mains, and more capacious reservoirs will become imperative, is fully appreciated by most water works men. Members of the same class, as a rule, also appreciate the fact that the water meter is the most equitable means of apportioning the cost of public water supplies among private consumers. But neither water works superintendents nor any other class of city officials have more than begun to realize the possibilities of the water meter as an aid to sanitation. As for the general public, and even large numbers of health officers and other sanitarians, the water meter is commonly regarded by them as a sanitary evil rather than as a sanitary necessity. In fact nearly every one who has introduced or tried to introduce the meter system knows only too well that the strongest opposition encountered often centers around the plea that the meters are a menace to health because they cause people to skimp in the use of water. The weakness of this and other assertions that meters are unsanitary has been repeatedly shown, but, so far as I am aware, no one has considered the water meter from the single standpoint of its relation to the public health.

The chief sanitary benefits which result from the use of water meters are:

(1) Purer water supplies.

(2) A wider and freer use of public water supplies.

(3) The extension of sewerage systems and their introduction in the smaller cities and towns.

(4) More money rendered available for other sanitary improvements.

METERS GIVE PURER WATER SUPPLIES

(1) The need for purer water supplies can scarcely be overstated. Typhoid fever alone, a large percentage of which is due to impure water, claims its thousands of lives every year. Besides this disease many minor ailments and much poor health are due to unwholesome water supplies. The indirect damage to health resulting from water which is so muddy or otherwise unpleasant as to discourage rather than encourage its use for bathing purposes cannct be estimated.

The rapid increase of water consumption, on the one hand, and the equally rapid pollution of available supplies, on the other, render the problem of securing pure water supplies more difficult every year. The growing appreciation of the danger from polluted water supplies, welcome as it is, adds to the perplexities of those charged with the administration of water-works plants. As the consumption and waste mount up, the choice gradually narrows to some distant source of supply or the purification of water from the near-by sources. Even if

* Associate Editor of *Engineering News*, New York, who read this paper before the eighth annual meeting of the American Society of Municipal Improvements, held at Niagara Falls, N. Y., October 1 to 4, 1901.

the former is chosen, the chances are that sooner or later, purification will be required.

The greatest obstacle to any improvement in the character of water supplies, whether by purification or going further afield, is the enormous volume required to meet the present demands and the far greater quantity that must be provided to keep pace with the increasing use and waste. The consensus of opinion on the part of all who have given the subject attention is that waste, not use, is chiefly responsible for the leaps and bounds in water consumption and that the waste may be curtailed, often to the extent of cutting the consumption in half, by the use of meters. If this is true, and I am firmly convinced that it is true, then the water meter may be made one of the most efficient sanitary agents of the century. Its universal introduction would go far towards solving the problem of providing pure water to every city dweller in this country.

Incidentally the meter system would aid in the struggle for pure water by diminishing the amount of sewage and thus simplifying and cheapening its final disposal without polluting some water supply. This in itself is a strong argument in favor of the water meter.

METERS PROMOTE WIDE AND FREE USE OF WATER

(2) A wider and freer use of public water supplies would follow the universal meter system. The reduced cost of the smaller supply, both in construction and operation, would make works feasible in many places now without them and would aid in extending existing plants to sparsely settled districts. In all except the larger cities of the country there are many people living on streets provided with water mains who continue to use private wells, often badly polluted, rather than pay a yearly rental for water. Reductions in the rental, made possible through the use of meters, would encourage the abandonment of wells.

In addition to the foregoing consideration and in some respects still more important, the meter system would extend the use of water by people of moderate means and by the very poor, many of whom, under schedule rates, have access to but one faucet for drawing water. That faucet is located over the kitchen sink or in some common hallway or yard. Cold water is all that can be drawn from this faucet, which materially lessens its usefulness for sanitary purposes. Now meters not only tend to lower water rates through the saving in waste already noted, but they make possible a complete readjustment of the cost of water service. First they make it easy to place the cost of fire protection, street sprinkling, and water for public buildings, in the general tax levy or to assess it upon the real and personal estate and the several public departments directly benefitted. This would materially lessen the portion of the cost of the water service which falls on private consumers. The water meters would then distribute the cost of the private service in proportion, not to the number and kind of plumbing fixtures a family happens to have, but to the amount of water which it uses and wastes. By means of this reduction and equalization of the cost of domestic service, a family which, under fixture rates could afford only a cold water faucet at the kitchen sink, might, under the meter plan, at no additional expense, have a bath tub and other fixtures, with hot and cold water, and perhaps a water closet besides.

FAVORS SMALL TOWNS AND CITIES

(3) The relation between water supply and sewerage are so intimate that what favors the introduction of one ought always to favor the other as well. All small and a growing number of large towns are being sewered on the separate plan—that is, one set of conduits removes house wastes, or sewage proper, and another set (but often not until years after) is provided for the removal of storm water. Obviously the less the water consumption, the less will be the sewage and the smaller may be the pipe system. If the sewage is either pumped or purified any decrease in amount is doubly welcome. The net effect of the use of meters on the sewage system, therefore, is to reduce its cost and thus to make it more readily available to all cities and towns and to all the people in each city. The introduction of sewerage systems, and their use after being introduced, is far less general than is the case with public water supplies. Moreover, many people defer water connections until sewer connections may also be made, on account of the well known cess-pool nuisance. The sanitary benefits of sewerage connections, with the abolition of privies and cess-pools are too obvious to need exposition here.

A GREAT MONEY SAVER

(4) Thus far the water meter has been considered in its relation to the public through the water works and sewerage systems. Important as these facilities are, it should not be forgotten that every dollar that can be saved through the use of meters is urgently needed for the sanitary betterment of the city in other particulars. Water supply, very properly, has always ranked first among municipal works. But hundreds of cities throughout the United States are spending money in a vain struggle to keep pace with increasing water consumption and waste which, under a proper meter system, would be available for such sanitary needs as improved sewage and garbage disposal, sanitary pavements, healthful school buildings, efficient health board work, and ample parks and play grounds.

RECENT EXPERIENCE WITH WOOD PAVEMENTS

Boston Wanted Noiseless Pavements—Favorably Impressed with Wood Pavements from Success in Europe—Good Results from Experiment Last Year—Large Contracts for Wood This Year

By B. T. Wheeler*

THE New England metropolis is a city of conservatism. Sprung from the Puritans, her people remain true to the traditions of their ancestors. Their progress has been a slow, but steady, one; and their development, along lines of careful investigation. Cleaving to that which was good, they have not hurried to adopt new conditions until convinced by demonstration which appealed to their good judgment that an improvement would result. Oftentimes our good city has waited for some more daring municipality to make the experiment; but she has seldom failed to avail herself of these experiments when they appealed to her judgment, and has often wrought from the crude beginnings of others the finished product which they had not conceived.

GRANITE CONSIDERED A NECESSITY AT FIRST

Boston's business district is compressed into a comparatively small area with densely crowded thoroughfares, outside of and surrounding which is a large suburban district containing the homes of her workers. Until within very recent years her business section has been paved with granite blocks; her residential streets, of macadam. Of the 491.85 miles† of public highways within the limits of the city 292 miles are still of macadam, and eighty-six of gravel. Within recent years there have been laid some areas of asphalt pavement—only 14.76 miles† in all—in an attempt to give the residential district closely adjoining the business section a permanent pavement which would bear the travel imposed upon it, without the noise of granite blocks or the dirtiness of macadam. Asphalt pavement has, however, never appealed strongly to the popular mind. Those who use the streets protest against it in the business sections and it is not desired by the pleasure-driving public in the suburban districts.

NOISELESS PAVEMENT DEMANDED

The problem of the Street Department has been for some years to provide a pavement which should be more noiseless than granite blocks, less slippery than, and as durable as, asphalt, and more permanent as to its wearing surface. During a previous incumbency of the office of superintendent of streets, six years ago, this problem was forced home to me. The Back Bay district of the city, so

* Superintendent of Streets, Boston, who read this paper before the eighth annual meeting of the American Society of Municipal Improvement, held at Niagara Falls, N. Y., October 1 to 4, 1901.

† Mileages given are of February 1, 1901.

INTERSECTION OF SCHOOL AND TREMONT STREETS, BOSTON, IN FRONT OF PARKER HOUSE. CREO-RESINATE WOOD PAVEMENT LAID IN SUMMER OF 1900

called, was densely populated with the homes of the wealthy class. Only a few years previous these citizens, protesting against the laying of an asphalt pavement in a boulevard known as Commonwealth avenue, had raised a fund, with the interest from which they are paying for a portion of the repairs of the macadam surface which was laid at their request. In 1895 a body of these citizens, upon another street in this district, had protested against an asphalt pavement, preferring macadam, and their desires were gratified; but, during the five years since, a change has come to many of these. The popular mind is not more inclined toward asphalt, and still complains of its slipperiness; but it is less inclined to endure the dust which dry weather, and the mud which wet weather produces upon a macadam surface, and granite-block pavement, even, is sometimes asked for in preference to either.

FAVORABLY LOCATED TO GRANITE SUPPLY

This city is particularly fortunate, because of its location, in the character of the granite-block pavements which it lays. Surrounded by some of the finest granite quarries of the world, she is enabled to obtain the best and smoothest blocks which nature helps to produce. These are laid, in recent years, upon a six-inch American cement concrete base, with a two-inch sand-bed, and the joints are filled with either road pitch and pebbles, or, during my control of her streets, with Portland cement grout. I believe today that Boston has the smoothest granite-block pavements in this country, if not in the world; but such pavement, while withstanding the wear of traffic and of time, is not fitted for the ear of tired human nature. Macadam has not permanency, is expensive to maintain in good repair, is unsanitary and disagreeable under the varying conditions of climate. Asphalt, to which large numbers of the cities of this country turn as an expedient and satisfactory pavement for residential and lightly traveled streets, does not fully meet the requirements of our city. Situated on the sea, and traversed by its estuaries, with widely varying temperature during all seasons, her climate is one for which asphalt seems less adapted than for that of any other large city of this country, because of the condensations of vapor which these climatic changes cause. Whether this moisture upon the surface remains fluid, or is frozen by the morning chill, almost equal slipperiness is produced; and it is necessary, during a surprisingly large number of mornings of the year, to sand completely all well-traveled asphalt streets where laid upon the slightest grade—and Boston, built upon the rugged contours of Massachusetts, having in her business section the three hills which first caught the eye of the

BOYLSTON STREET, BOSTON, LOOKING TOWARD TREMONT STREET. PAVED WITH CREO-RESINATE GROOVED BLOCK, THEREBY PROVIDING JOINTS TO GIVE INCREASED FOOTHOLD ON A GRADE

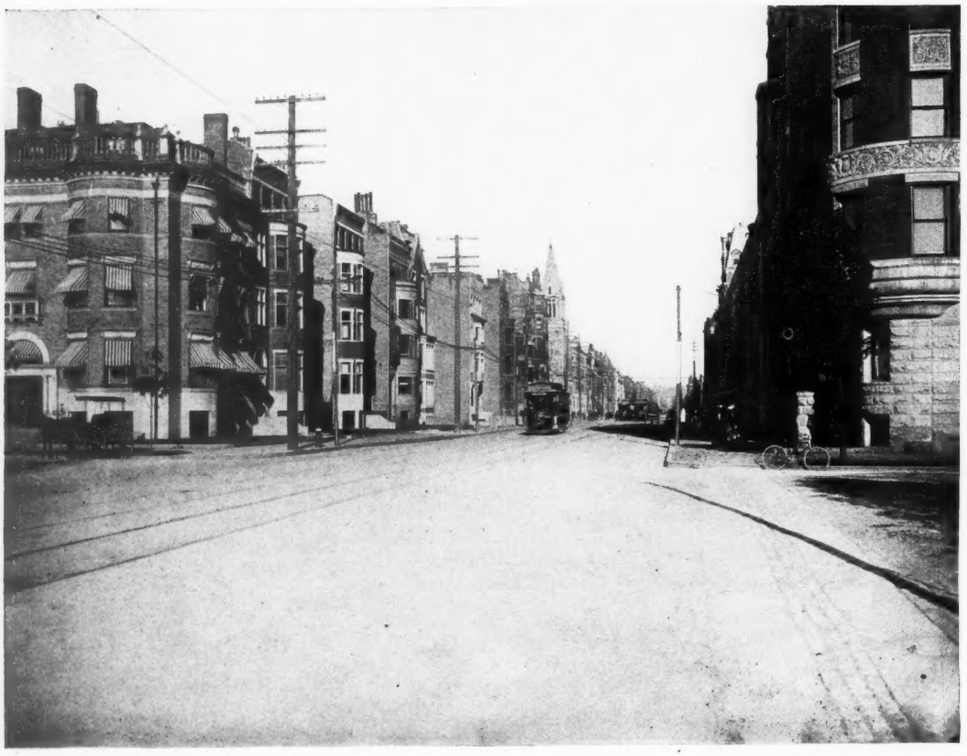
voyager of the fifteenth century, has very little area of level street surface.

Until last year, when I again assumed control of the Street Department, no forms of pavement had been attempted beside those mentioned, except unsatisfactory experiments with brick and coal-tar concrete. Neither brick nor coal-tar products can withstand the traffic of even our densely populated suburban districts.

In an attempt to solve the problem thus presented, some experiments have recently been made in the laying of wooden pavements, after noting the results achieved in the few sections of this country in which they have been laid.

WOODEN BLOCK A SUCCESS IN EUROPE

Treated wooden block paving has been used in London for over thirty years on both her finest and most heavily trafficked roadways. Paris has nearly four times as many square yards of it in use as of asphalt. There had been laid in 1891 484,000 square metres, and in 1898 1,165,000 square metres of wooden blocks, there being at that time 382,600 square metres of asphalt, and 1,348,000 square metres of macadam.



BEACON STREET NEAR MASSACHUSETTS AVENUE, BOSTON. CREO-RESINATE WOOD PAVEMENT JUST COMPLETED IN SEPTEMBER*

Foreign growths of wood are, however, practically prohibited for use in this country by reason of their large cost. To produce a pavement at moderate and justifiable expense, a native wood must be used, so treated, if possible, as to harden its fiber, make it practically impervious to moisture, and not readily susceptible to the varying conditions of heat and cold. There is no gauge of durability by which the attempts to produce such results can now be judged. Practice has not yet demonstrated in this country what our natural products can create in the way of a permanent pavement of this character.

ITS INTRODUCTION IN BOSTON

There were laid last year in this city, for experimental purposes, in the midst of the otherwise asphalted surface of a busy, but lightly trafficked, thoroughfare, two small areas of wooden blocks, 1,360 square yards in all, treated by the so-called "creo-resinate" process. These areas were laid in the steepest grades thereof, and in one case for only half the width of the street, the other half being of asphalt, that the relative merits of the two might be compared.

This pavement was prepared and laid in the following manner:

The blocks were uniformly four inches wide, four inches deep and eight inches long, of long-leaf Georgia yellow pine, free from sap, loose or rotten knots, and with no second-growth timber allowed. These blocks were placed in an air-tight cylinder, and the dry heat was raised to 215 degrees Fahrenheit, without pressure, for one hour, for the purpose of expelling the moisture. The heat was then increased, pressure was applied, and the degree of both was raised gradually, in order to avoid injury to the fiber, during a period of two hours, until the heat had reached 285 degrees, and the pressure about ninety pounds, and both were then held at that point for one hour. The heat was then shut off, and the tanks allowed to cool gradually for one hour. At the end of this time the heat had been reduced to 250 degrees, and the pressure to about forty pounds. The pressure was then blown off and the heat still further reduced. Vacuum was then applied until about twenty-six inches was reached; and, while under vacuum, the creo-resinate mixture was run into the cylinders at a temperature of from 175 to 200 degrees, and hydraulic pressure was then applied, reaching 200 pounds per square inch, and kept at this point until from twenty-one to twenty-two pounds of the mixture per cubic foot had been absorbed. The liquid was then run off, and the wood placed in another cylinder, and milk of lime at a temperature of 150 degrees was run in, and hydraulic pressure of about 200 pounds was applied for one hour.

The blocks were laid with the grain vertical upon a foundation consisting of American cement concrete, six inches in depth, with a one-inch cushion of clean, screened sand, and were driven tightly together at every sixth row. The joints were then filled with dry, screened sand, and the pavement rolled with a five-ton steam roller until the blocks presented a firm, uniform and unyielding surface. The joints were then filled with a creo-resinate mixture of road pitch, heated to 300 degrees Fahrenheit, and the whole covered temporarily with one-quarter inch dressing of clean, screened, sharp sand.

THE RESULTS PROVE SATISFACTORY

It is apparent, after a year's experience with this pavement, that it is satisfactory as so laid in every respect, except with regard to slipperiness, and that, as so laid, an almost absolutely noiseless pavement was obtained, the surface of which, under use, became so unified that the joints were indistinguishable, and the pavement consequently slippery. No wear has yet been apparent. The surface remains perfect, and, in comparison with the asphalt adjoining it, it is preferable in all respects except that of slipperiness, in which, practically, it does not differ; and, upon the grade of 4 per cent. at which it was laid, it has nothing to recommend it in this respect.

I have this year laid an area of 7,940 square yards upon a level street, in the same manner as above described, which I believe will be eminently satisfactory in every respect, and am about to lay this fall another area of 6,640 square yards upon a nearly level street, where I expect the same results; but the problem of a noiseless, non-

* The surface of the street, being recently completed, is covered with pitch and sand, hence the joints between the blocks do not show.

HARVARD BRIDGE, BETWEEN BOSTON AND CAMBRIDGE. 1,500 YARDS NOW BEING REDECKED WITH CREO-RESINATE PLANKING, PREPARATORY TO PAVING WITH WOOD BLOCKS TREATED WITH THE SAME PROCESS

slippery and permanent pavement which can be laid upon grades exceeding 2 per cent. has not yet been satisfactorily solved. With the hope of more satisfactory results in this respect, however, I have laid upon a 3 per cent. grade an area of 2,000 square yards of wooden blocks, so recently put down as not to permit me to make any statement of the results obtained. This was laid from blocks prepared as above mentioned, differing only in shape and in the character of the joint. From each block, four by four by eight inches, there was removed from one side at the top a section one-quarter inch in thickness for the length of the block, and one and one-half inches in depth. When these blocks were laid as above described, and driven closely, there was a quarter of an inch opening, or joint, remaining, extending clear across the street with each width of block, one-quarter of an inch wide, and one and one-half inches in depth. These joints were filled with Portland cement grout concrete. It is my expectation that this material upon the surface of the street every four inches will remove the slippery conditions which would otherwise exist, and furnish better foothold for horses.

LARGE AMOUNT LAID THIS YEAR

There is in my charge, as commissioner having the care—with a representative of the adjoining city of Cambridge—of those bridges crossing the Charles River and connecting the two municipalities, a bridge called Harvard Bridge, having a roadway area of 11,425 square yards. This bridge was built in 1891 within an insufficient appropriation, and in a manner which has proved to be a falsely economical one. In order to diminish the cost the structure was lightened and designed only to carry a wooden floor of four-inch deck and two-inch sheathing. Traffic upon this bridge has rapidly increased, and it has been necessary for some years to resheathe it annually; and it has now become apparent that two resheathings each year will only suffice. As the deck of the structure now shows signs of decay, it has been decided to redeck this entire structure with a hard pine deck, treated by the same creo-resinate process as are the blocks, and directly upon this the wooden-block pavement will be laid, closely driven and without joints; and a contract for this work is now being executed by the United States Wood Preserving Company of New York, which controls the creo-resinate process. What has for years had many of the characteristics of an uneven corduroy roadway, caused by the rapid wearing of the sheathing plank, will soon present an even, noiseless, smoothly-riding surface, which will not subject the two cities to the cost of annual repairs. Wooden blocks have, therefore, filled a unique place in furnishing a permanent and satisfactory pavement, placed upon a structure which was not designed to carry the load of any other form of permanent pavement known.

HAS MANY ADVANTAGES

I was brought to the execution of this work by the experience of the city of Chicago in laying a wooden pavement—treated, however, by another process—upon the Rush Street Bridge, which carried a large part of the freight traffic of an important railroad terminal, and which had required, therefore, many renewals annually of the wooden wearing surface of plank. This pavement had been laid over two years and a half, I think, when I last saw it, and was still apparently in first-class condition. Wooden pavement has therefore, it seems to me, a field peculiarly its own in replacing the plank surface of bridges in an economical and satisfactory manner.

The only question, aside from the desirability of laying such pavement upon steep grades, which I have already referred to, and which has not yet been satisfactorily demonstrated, is, then, one of durability, which time alone can determine; but the company which has laid this pavement has, for the protection of the city which I represent, given a good and sufficient guarantee to keep the same in condition satisfactory to the Superintendent of Streets for a period of ten years.

Wooden pavement has, then, these demonstrated advantages: it is noiseless; it remains where it is put—in other words, it does not creep or crawl, as in the case of asphalt wearing surfaces, becoming billowy under traffic; it can be taken up for necessary excavation—that *bete noir* of all street superintendents—and relaid handily, satisfactorily, and without large paraphernalia. These known qualities commend it; and I believe that the test of time will prove its durability and its superiority under moderate traffic and in residential sections, over any other pavement now laid.

USE OF COAL TAR IN BITUMINOUS PAVEMENTS

The Quality Must Be Ascertained by Scientific Experiments—Practical Chemist Best Adviser—Persistent Laboratory Work Yields Author Good Results—Valuable Experience and Results

By Fred J. Warren

In judging of the possibilities from the use of any material it is best, it possible, to form an opinion based on practice rather than upon theory, and this is especially true when dealing with the bitumens.

The bitumens vary by insensible degrees from natural, or artificial gas, into the oils, malthas or tars and then into cements or pitches and passing the state of a cement into glance pitch or export pitch, and finally into a coke with no cementing property whatever.

The office of the bitumen in a pavement is to bind mineral particles together in forming a bituminous mortar or concrete. It is quite evident at many points that it is entirely unsuitable for use in pavement work.

Asphaltum and coal tar are names applied to impure bitumen, and the percentage of bitumen in any given crude or refined material varies greatly, and naturally the quantity to be used depends upon its purity; yet the purity has no relation to its quality, and in fact it is frequently the case that the non-bituminous matter native to a bituminous cement is quite essential to efficiency, and if not present naturally its equivalent must be supplied. According to the presence of the mineral, the component parts of the pavement mixture, should be varied.

VARIOUS CHEMICAL COMBINATIONS

It should be understood that the best chemical authorities agree that bitumen has no fixed combination, or composition of qualities, and that its natural and physical properties are as various as its source of supply. It is simply a mixture of various hydro-carbons, and may be either a solid or a liquid. Professor Regis Chauvenet, one of the best mineralogists of to-day and president of the Colorado State School of Mines, has said: "Of course any person sufficiently skilled in manipulation can try practical experiments on commercial substances, but so far as analysis is concerned, I do not hesitate to say that I would not venture on the examination of a bitumen to pronounce on its value as a paving material." Prof. Albert H. Low, has said: "It becomes important to know to what extent a chemist can be of service in bituminous pavement construction. It may be answered that, a chemist who has made a special study of the subject can, by proper chemical analysis and by certain physical tests, point out what is probably good or worth trying, but it is impossible to say it will be fully equal to one that has proved a success. Having learned by experience the chemical and physical differences between good and bad samples of any particular material, the chemist may thereafter afford valuable assistance in the use of that material."

PRACTICAL ADVICE WORTH CONSIDERING

I may add that my experience has been that the advice of chemists who have not made a special study of bituminous pavement construction can give no advice worth having, and frequently give advice which is so misleading as to be worse than useless; but a chemist of training and experience in the business or with the practical use of bitumen, can furnish certain chemical and physical conditions which are invaluable to those in charge of work, and without which it is impossible to accomplish good results on a large scale; therefore, it should be considered:

1st. That the physical condition of coal tar varies in its native state from different supplies.

2d. That its physical conditions can be greatly changed by refining and chemical treatment.

3d. That it can be ruined by overheating.

4th. That the manufacturers have used most every grade of gas works refuse without special treatment.

5th. That none of the modern methods of attaining exact uniformity of consistency of bituminous cement have been employed by the manufacturer in the preparation of coal tar cements.

In the above will be found one, and the principal cause of poor bituminous coal tar pavements. It should be considered in addition:

1st. That the manufacturers of the coal tar cements have not been interested in the laying of pavements, and have had but little knowledge of the practical requirements.

2d. That the contractors for the pavements have generally adopted hand methods, which would not accomplish uniformity.

3d. That contractors have not followed the development in the grading and selection of the mineral aggregates.

4th. They have generally been roofers, or others who have done business only locally, and have had no general or technical knowledge of the materials being used, and while all could distinguish great physical differences in the manufactured material furnished, they had no way of improvement, nor sufficient interest to study the matter carefully.

BITUMINOUS CONCRETE SIDEWALK, LAID IN 1868, TAUNTON, MASS. NO REPAIRS. TAR BITUMEN USED

The physical differences in the pavements grow out of all these conditions and pavements have been built, and are still being built, largely for sidewalks with all grades of material, from limpid, liquid water gas, or blast furnace, tars to hard brittle pitches, with all or practically all, of its life removed, and these varying materials have been used in all kinds of proportion.

GREAT POSSIBILITIES IN THE USE OF BITUMEN

The possibilities of the use of coal tar in bituminous pavements may be judged by the hundreds of small pieces of sidewalk pavements and many sections of roadway pavement in cities of this country, which are in a good state of preservation after many years of use and exposure, as will be seen in one of the accompanying illustrations.

These samples may not represent ten square yards out of ten thousand square yards that were laid more than twenty years ago, and in some cases over forty years since, but they are of sufficient number and quantity to demonstrate the possibilities.

The large quantity of pavements in which coal tar or coal tar cements have been used and which have failed, or have partially failed, only illustrates the lack of knowledge, care and uniformity in the manufacture of the pavement and the preparation of the cement.

The making of a bituminous pavement is a very complex matter, and one who undertakes to do good work without the aid of extended practice and records of conditions and results, will find that variations of conditions which to him are entirely unnoticeable make a vast difference in results.

At this time the most expert bituminous pavers confine themselves largely to duplicating in detail the exact conditions which have previously produced good work, and spend large sums in keeping records of all conditions present both from methods and grades of material used and by analysis of the resultant mixture. While others without this experience often do good work by duplicating the proportions of the more careful.

The entire advance of scientific methods as applied to bituminous street pavements has, in the past, been confined almost, if not, entirely to the use of natural asphalt. This also applies to the manufacture of the bituminous cements.

If the bitumen used lacks cementing properties, it fails to do its work properly. If the bitumen is too soft the pavement may be useless, and will cut up and roll, and will not sustain traffic. If the bitumen is too hard, it fails to be a cement, or binding material in cold weather and cracking is liable to occur, and wearing takes place rapidly from the surface, in consequence of the mineral particles of the pavement becoming dislodged from its body by traffic.

This wear might also be produced by disintegration from water, or by the use of improper bitumen, or the cement may, and often is, ruined, or its life shortened, by exposure in minute particles by use of improperly graded mineral grains. In my study of the subject I have tried to avoid theories and have made an effort to detect and record conditions by a careful chemical and physical analysis of the pavements in use, paying as much attention to early failures as to those in use more than twenty years. The recorded details are too voluminous for this paper, but furnish ample reason for the opinion that it is only a question of further recording of all conditions of construction, and careful development to produce bituminous pavements with coal tar cements of great economic value. The uniformity of the failures under certain conditions and the uniformity of the successes under other conditions is quite noticeable.

IMPORTANT CONSIDERATIONS

One condition quite contrary to the generally accepted practice in the manufacture of bituminous pavements is worthy of note, and that is that the very oldest bituminous pavements in this country have a coal tar cement as a base and have a coarser grain than has been used or considered proper in bituminous pavements, and all of them have a smaller percentage of voids in the mineral aggregate than is possible where only fine sand and stone dust is used.

Another notable condition is that all of the oldest coal tar pavements did not have a hydraulic concrete foundation.

The analysis of a large number of old and new pavements and a careful consideration of recorded conditions on the subject seem to justify the conclusion that the life of a bituminous pavement depends largely on the following conditions:

1st. The proper selection of a good quality of crude bitumen.

2d. The careful manufacture of the bitumen into a cement without overheating and by proper process which will not injure but improve its physical properties.

3d. The preparation of a cement of the right consistency to accomplish the longest life possible with the mineral aggregate used.

In determining the consistency of cement, the following should be considered:

1st. That the softer the cement the longer its life.

2d. The coarser the mineral grain the greater rigidity produced by the grain itself.

3d. The coarser the grain the fewer the voids, if the sizes are properly graded.

4th. The fewer the voids and the coarser the grain the heavier is the bituminous coating where the same percentage is used.

5th. The more thoroughly the surface is bound to the foundation the less liability of waving, and consequently the possibility of using a softer cement.

It should also be understood that the life of the bitumen depends upon its use in a dense mineral mixture, and that no bituminous pavements have ever produced long life where the voids in the mineral aggregate were not practically completely filled with bituminous cement.

CONCLUSIONS

All bituminous materials are subject to evaporation, oxidizing or apparent drying on exposure, and the length of time which it takes to change the physical nature of the bitumen depends upon the condition of its exposure. If exposed in minute particles around the fine grain of sand, where, for instance, there may be a coat of less than 1-4000 of an inch in thickness, then on exposure the hardening of the coal tar cement would be so rapid as to cause a very short life; while, if the mixture is absolutely dense, the cement on exposure does not change its physical condition for many years except on the surface, and acts as a permanent binding material.

ONE SECTION OF MR. WARREN'S LABORATORY

If the above conclusions are correct, then a bituminous concrete wearing surface, using coarse particles of stone and thoroughly binding the wearing surface to the base which will hold it in place, will furnish the best tar pavement possible.

It should be understood, however, that if a pavement which would be entirely satisfactory laid on top of a crushed stone foundation where the top would bind into the foundation, might, if laid upon a smooth concrete surface, slip and slide and prove absolutely worthless.

I have in mind a pavement which was laid recently by the company with which I am connected and where the surface mixture had been entirely satisfactory laid on top of a coarse rolled stone foundation; but the surface on a small section laid experimentally on top of a smooth foundation has waved to such an extent as to be very unsatisfactory. With the exception of the foundation the method and materials employed and the traffic conditions were identical.

THE EVOLUTION OF STREET PAVING IN CHICAGO

Peculiar Difficulties to Overcome—Varied Experience with Poor Pavements—Popularity of Macadam—Improved by Granite Top Dressing—Wood, Asphalt and Brick Growing in Popularity

By Howard H. Gross

THE story of the growth of Chicago from a marsh to a metropolis in the brief space of sixty years is unique and has no parallel in the history of municipalities. Wonderful as Chicago is in her growth and achievements, she is full of contradictions and inconsistencies. She has the finest buildings facing the worst streets that can be found upon two continents.

The pre-existing conditions were the most unfavorable possible for the building of a great city; viz., a low, flat, marshy plain without natural drainage or a natural harbor. It may well be asked if, after all, Chicago is not an accident?

PECULIAR DIFFICULTIES TO OVERCOME

One of the most interesting phases of the transition of Chicago is the story of her streets. The character of the soil in and about the city was such that at some seasons of the year the roads and streets were impassable. The signs, "No bottom here," were frequently seen upon the main streets. It has been said that at times a man could carry on his back more than a team could draw in a wagon. The first relief was the toll roads made of plank. These were generally laid on the main thoroughfares leading from Chicago towards other towns and trading posts, and for many years the old plank roads served their purpose and then passed into history.

To overcome the difficulty of drainage new grades were established and the whole central part of the city was filled in from six to twelve feet; thus did the city pull itself from a lower to a higher mud level. This made land furnished a very unsubstantial foundation for street building and presented a new problem, the solution of which was only found—if found it has been—after years of experiment and the expenditure of millions of dollars.

ONE BAD PAVEMENT SUCCEEDS ANOTHER

The plank road was succeeded by a poor sort of Nicholson pavement, and this in turn was followed by cedar blocks which, for many years, were used to the exclusion of everything else. This "vegetable pavement," as it was called by our late distinguished citizen, Hon. Joseph Medill, had no foundation or a foundation of a poor quality, consisting of inch boards laid on the mud; upon these were set round cedar blocks six inches long and from four to twelve inches in diameter, the interstices between the blocks being filled with gravel. Later the "foundation" was made of two inch hemlock plank.

If laid in very dry weather, the blocks, after a rain, would swell and either push out the curb stones, or the blocks would form an arch and raise from two to six inches off the board foundation. When in this position the rumbling of wheels over the pavement was similar to the passing of vehicles over a bridge. If the blocks were laid wet, they would shrink and become loose, then in a heavy rain the blocks would rise and float out of position before they had time to swell. Cedar blocks as a pioneer pavement in the earlier years may have served a useful purpose, but for the last twenty years they have been a curse to the city, a menace to health, and a waste of money. Public sentiment is now against them, and the Board of Local Improvements has discontinued their use.

On streets carrying the heavier traffic cobble stones laid on a bed of sand were tried, and while more lasting than cedar, the noise and roughness was so great that they soon fell into disfavor. Their last use was by the street car companies in paving their right of way in the old days before cable and trolley cars were dreamed of.

EXCELLENT MACADAM PAVEMENTS LAID

Chicago is underlaid with a strata of the finest quality of limestone hundreds of feet thick and in places cropping out at the surface. A few miles southwest and also northwest may be found inexhaustible beds of excellent gravel. The wonder, then, is that with this material at hand cedar blocks should have been so largely used.

In the outlying districts generally, and often on inside streets, fifteen to thirty years ago, macadam or gravel streets were laid. These were sometimes put down before the sewers were in, and as might be expected in those instances the material soon disappeared in the muck. On the streets properly drained these macadam roads served a good purpose and lasted from ten to twenty years, according to the amount of traffic, depending somewhat upon the fidelity of the contractor and watchfulness of the inspectors. There are probably one hundred and fifty to two hundred miles of these old macadam streets that are now candidates for resurfacing with asphalt, brick or crushed granite.

Perhaps half of the macadam streets laid were upon a foundation of rolling mill slag which was first tried in 1866, and has since been largely used and with great success. Slag is cheaper than limestone, and owing to its high cementing qualities it makes a stronger and more lasting foundation. It will be interesting to note, in this connection, that over two thousand barrels per day of high grade Portland cement is being made from ground slag.

LIMESTONE MACADAM IMPROVED BY GRANITE TOP

The macadam streets built of limestone were very dusty, the surface grinding up into an impalpable white powder that filled the air and sifted into the houses, damaging furniture and carpets and often making life a burden. In the demand for better pavements granite top macadam streets were introduced, and they have almost wholly replaced the limestone and gravel surfaces. The life of a macadam street with a three-inch wearing surface of crushed Wisconsin granite is nearly twice that of an all limestone pavement. Granite top macadam is becoming more and more popular, and by many it is preferred to asphalt.

The smaller cities of Illinois and Wisconsin are using it with success in place of brick, it being much cheaper and serving the purpose quite as well. Granite macadam is the most satisfactory street for pleasure driving we have, and probably the best that can be built here.

HOW TO LAY BEST TYPE OF MACADAM

The highest type of granite macadam streets are laid substantially as follows: A bed of slag is first spread and rolled down with a steam roller to a compact mass seven to ten inches deep, depending upon the traffic and the character of the subgrade whether sand or clay loam; over this is spread a layer of two or three inches of limestone, one to one and a half inches in size, bonded with limestone screenings. When this is thoroughly wet and rolled crushed Wisconsin granite, one to two inches in size, is spread to a depth of three inches over the stone surface. This is covered with one to one and one-half inches of fine bonding gravel, carrying, say, 25 per cent. of clay loam. The surface is then fairly flooded with water and thoroughly rolled with a ten or twelve ton steam roller until the gravel is washed and rolled down into the granite bonding it. The rolling continues until the material ceases to creep before the roller; then about one-half an inch of fine crushed granite one-eighth to one-half inch in size is spread over the surface and the roller is again passed over it, completing the work. This pavement costs complete about $1.00 per square yard. The life of this pavement, on residence streets, is from twelve to eighteen years, at the expiration of which time the slag foundation will be found cemented together in a firm bond, and is a first-class foundation for brick, asphalt, or a resurfacing with crushed granite. A heavy macadam street, which should be considered a pioneer pavement, is always an asset, and worth a hundred cents on the dollar to incorporate into the subsequent permanent pavement as its foundation.

PUBLIC'S CHOICE OF PAVEMENTS

Public sentiment here seems to be crystalizing about as follows: For best residence districts and the down-town retail districts, asphalt; the wholesale and manufacturing districts, Belgian blocks of Wisconsin granite; outlying business streets on car lines, brick or asphalt; suburban and cheaper residence property, granite macadam.

Under the Special Assessment law, passed by the last general assembly, we have a Board of Local Improvements, composed of five first-class business men who devote their whole time to the consideration of improvements. While the board has been organized but a few weeks and is yet new to the business, it has given evidence of a purpose to inaugurate business methods and bring the city streets up to the standard which public sentiment and the necessities of the city require, and in its effort to do this, it will have the earnest support and co-operation of our best citizens.

THE GROWING POPULARITY OF BRICK PAVEMENTS

Of Recent Origin—Rapid Growth of Industry—How Good Pavers Are Made—Noisier But Longer Lived and Cheaper Than Asphalt—How to Test Paving Bricks

By H. A. Wheeler, E. M

THE use of paving brick in the United States only dates back as far as 1870, when the town of Charleston, W. Va., laid a block with selected, hard-burned common brick as an experiment on one of its principal streets. The care with which these pioneer brick were selected, the excellence of the clay, and the process by which they were made (soft mud) gave results that were so satisfactory, that more brick were laid in 1873, which the writer understands are still in use. Bloomington, Ill., in 1875, also laid a block with hard common brick, which, though very much inferior in quality to the Charleston brick, lasted twenty years. St. Louis experimented with several kinds of brick, from 1873 to 1881, and, though some were especially made as paving brick, they were practically all failures, but much valuable negative evidence was obtained.

FIRST VITRIFIED PAVING BRICK MADE IN 1883

Wheeling, W. Va., in 1883, successfully used some very hard-burned brick that were made from an impure fireclay that had been especially made as pavers. The modern paving brick industry may be said to date from this Wheeling venture, for, up to this time, the brick used for pavers were selected from hard-burned building brick, and no especial effort had been made to secure the toughness and hardness that is so essential in a paver. In the following year, (1884), Galesburg, Ill., laid some paving brick that were made from shale, and the superiority of these shale-made bricks was so obvious that now nearly all paving brick is made from this material, and this town has developed into the largest manufacturing centre for paving brick in this country.

RAPID GROWTH OF THE INDUSTRY

The manufacture of brick, especially for paving purposes, resulted in a commercial development of the industry by 1885, as the smaller cities and towns were prompt to recognize that paving brick possessed great merit for a high grade pavement, while its cost was moderate and within their means. Since then its use has grown enormously—at first slowly, but as the manufacturers learned how to make better brick, and reliable tests were instituted to insure a high quality the use of brick has become almost universal in every city and town that can afford to pave, from the Atlantic to the Rocky Mountains, while many of the finest and largest brick plants in this country are exclusively devoted to the manufacture of paving brick.

That many of the earlier brick pavements were faulty must be obvious, when one considers that first the brick makers had to learn how to make a paver, what kind of material to use, and the care necessary in the sorting. The earlier municipal engineers also had to learn how to properly test pavers, how to lay them, and to realize that a good foundation is as necessary under brick to get good results as in everything else.

EXPERIENCE IMPROVED THE QUALITY

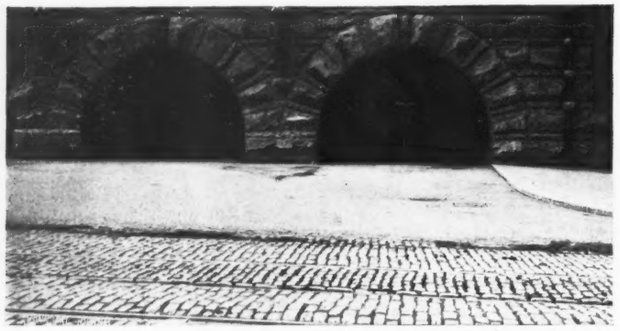
Paving brick to-day is now made from either class of fireclays that possess sufficient fluxing impurities that they can be vitrified (known also as "bastard fireclays"), or, else from shale. Shale is a laminated fossil clay (also known as "soft slate" and "soapstone") that frequently contains the proper amount of fluxing constituents that enables the clay base to be thoroughly vitrified, yet it vitrifies so gradually, or so slowly passes through the viscous condition, that it is within the range of the kiln-burner to bring the brick up to this vital, dangerous temperature of vitrification without having the bricks lose their shape from getting too soft. Common clays can usually be vitrified if one possesses the skill and means to just bring them up to the critical temperature without having them melt, but this is usually too difficult to successfully accomplish in an ordinary kiln with the ordinary burner, at least to a reasonably large percentage of yield. Many shales are also lacking in the proper physical and chemical constituents to successfully make good, tough pavers, which the practical brick maker has too frequently found out after he has completed his plant, and these are the men who rail against the engineers and their tests.

In the manufacture of paving brick, the shale or fireclay (as coarse, hard, lumps as they come from the bank or mine) is first crushed to a fine powder under the heavy rollers or mullers of large dry-pans, then screened to eliminate all material coarser than one-eighth

A MODERN ST. LOUIS BRICK PAVED STREET, LAID IN 1901

to one-sixteenth-inch, then tempered with water to a stiff, plastic mud in a pug mill, when it is fed to the brick machine. The latter is now almost universally a continuous revolving auger that forces out a bar of clay that is automatically cut by wires into brick lengths. The bricks are then repressed, while still fresh from the brick machine, to round off the corners and angles, in repressing machines, then stacked upon iron cars and dried in drying funnels in twenty-four to forty-eight hours. When dry the bricks are set in down-draught kilns and then left to the mercy of the burner. Up to this point the manager can watch and quickly note the character of the grinding, tempering, moulding, repressing, drying, and setting, all of which have much influence on the quality of the brick. But after the kiln fires are lit, the most important stage of the manufacturing begins, and during the eight to sixteen days of continuous firing, followed by six to nine days of cooling and annealing, the bricks are largely dependent on the skill and faithfulness of the burner. While the theory of burning is simple, it is not so easy to secure the intelligence and faithfulness required to prevent overburning, underburn-

ing, checking, rolling, splitting, crushing and the other ills due to poor burning, and until the kiln is opened, it is a question whether the kiln will turn out 90 per cent. or less than 50 per cent. of first class pavers. In a well-burned kiln, there is a small percentage of brick on top that is air-checked and overburned, but they make excellent sewer, bridge and foundation material; under these are the pavers, which usually make up 60 to 85 per cent. of the kiln, and which show slight kiln marks or indentations from the overlying



BRICK PAVEMENT AT ENTRANCE TO ST. LOUIS UNION DEPOT, LAID 1893

bricks. At the bottom are from two to six courses of bricks that are underburned or too soft for pavers, but they make good building brick.

HOW TO TEST BRICKS

In testing paving brick, it was formerly thought necessary to determine the absorption, crushing strength, cross-breaking strength, hardness and specific gravity, besides the loss in the rattler. While in a general way the lower the absorption, and the higher the crushing, cross-breaking, hardness, and specific gravity the better the brick, it has been found from a study of a very large and expensive series of careful tests that the best or toughest paving brick as determinated by the rattler does not always stand first in the other tests. Thus, of two bricks made from the same clay, if one was overburned or completely vitrified or glossy, it would show a lower absorption and a higher crushing strength than one burned not quite so hard, yet the latter would be much tougher and therefore a much better paver. While engineers who have studied the subject have been quite willing to concede that the crushing and cross-breaking strengths, hardness and specific gravity of even the poorest pavers was ample to meet the demands of street service, many were loth to abandon the absorption test, so that this is still found in some specifications, though it is a relic of pioneer practice. Formerly the absorption limit was placed at 1 to 2 per cent., which was a sad reflection on the observation, or rather lack of observation, of these earlier engineers. For this limit would have condemned all the old pavements in this country, where the brick had been in continuous, successful service for ten to twenty years, as they absorb from 3 to 6 per cent. of water after twenty-four hours soaking. Possibly the origin of this very low limit was due to the failure to distinguish between a technical and a popular definition. For while paving brick have always been known as vitrified brick, this form was used technically, and not in the popular sense that it meant a glossy brick. For in clay products, a keen distinction is made between ware like paving brick that has been *incipiently vitrified*, or when the particles have so fused and coalesced that the individual grains of the clay can no longer be discerned, when a clay has its maximum toughness, and *completely vitrified*, when the clay becomes glossy and is now brittle.

PROF. ORTON'S EXPERIMENTS

The researches carried on by Prof. Orton for the committee on paving brick tests of the National Bricklayers' Association show conclusively that this absorption first can be safely ignored, if the rattler test is satisfactory.

The rattler test is now conducted in an iron rattler of specified standard design, in which blocks of iron are also added to the charge, to secure an effective impact as well as abrasive action. The severe rubbing and pounding that the bricks receive in 1,000 revolutions of the rattler, with the greatly increased wear due to the attrition of the broken-off fragments of the brick, makes this more nearly correspond to the actual service that the bricks will receive in practice than any other test thus far devised, and which has been found to give results that harmonize with the actual wear of the brick in the streets.

The tendency is for engineers to keep raising their specifications, and demand better brick from the manufacturer. The intelligent brick makers know how to make a better brick than they are now marketing, but while superior goods are always the most economical, their cost of manufacture is necessarily higher. Weathering the clay, finer grinding, more thorough tempering, more expensive but better brick machines, better dryers, more careful and slower burning and cooling would all add to the quality of the brick, but they all increase its cost. As our municipalities form the market for at least 90 per cent. of the pavers, and as the lowest bidder secures the contract in almost all cases, the brick maker has got to lower his cost to a minimum if he is going to sell brick and stay in business. Hence, he can only afford to make a brick that will just pass the tests, in order to hold his trade. If engineers are willing to pay for better bricks they can get them, but under the present system there is no inducement to the brick maker to make a brick that he cannot sell at least as cheap as his neighbor.

HOW TO LAY THE BRICKS

Paving bricks are made in two sizes, or about 2½x4x8 inches, or building brick size, and 3x4x9 or block size. The former size enables the seconds to be disposed of as builders, as they can be worked in with building brick, whereas the block size cannot. Where the factories have only a local country trade to absorb their seconds, the small size makes it much easier to dispose of them; but as the block size is somewhat cheaper to make and lay, and wears better, it will probably become the standard size.

In laying paving brick, after the sub-grade has been prepared, crowned, and the curbing set, a foundation of concrete is laid that is made six inches thick, to eight inches for very heavy traffic. On this is spread a uniform cushion of sand from one and one-half to two inches in thickness, to take up the inequalities and roughness in the bricks and concrete. On this sand-bed the bricks are laid dry at right angles to the curb line, after which they are well rolled to a uniform, mooth surface with a five to seven-ton roller. After the rolling the bricks are again inspected, to remove any broken or faulty ones that the roller may have disclosed. The joints between the brick are then filled with either dry sand, or hot tar, or a Portland cement grout. The sand filler is the cheapest, it enables the brick to be easily torn up, but it washes out and leaves the edges of the brick exposed, causing it to cobble, and it is pervious, too.

The tar or asphalt fillers are free from these objections to sand, but they are liable to be extruded in very hot weather. A cement filler makes a monolith of the pavement, and decidedly improves its durability, but unless expansion joints are used, it is liable to be a noisy, drumming pavement from the arching up of the bricks from the foundation, either from expansion of the bricks, or from contraction and settlement of the concrete foundation beneath.

A ST. LOUIS ALLEY, PAVED WITH BRICK IN 1894

BRICK PAVEMENTS OF LONG LIFE

What the life of such a brick pavement is has still to be determined, as no modern paving bricks have thus far been worn out, not even in Chicago, where some bricks were laid about six years ago that have been subjected to the severest metropolitan traffic. The earlier brick pavements have lasted twenty years or more, but these were all laid in small cities and towns of 70,000 or less population. Sufficient experience has been gained, however, to show that only one class of pavements last longer.

As regards repairs, brick holds a similar position to the other chief pavements, or granite, asphalt and macadam, being somewhat more costly than granite to maintain, but is very much cheaper than asphalt or macadam.

As regards traction, asphalt and macadam, if properly kept up, are somewhat superior to brick; but as they are actually found in most cities, with their holes, ruts and mud, the brick offers easier traction, which is such a vital feature in all pavements. Of course granite is very much inferior to brick and the others on this score.

As regards foothold to the horse, brick is only superior to asphalt as the joints give a hold to the toes and thus avoid the slipperiness of the latter. Granite and macadam are much superior to both.

For cleanliness, brick is somewhat inferior to asphalt, but much superior to granite pavements or macadam. Brick is especially favorable for cleaning by the modern excellent hydraulic method if tar or cement is used as the filler. The healthfulness of the pavements also stand in about this same order.

As regards noise, brick is much inferior to macadam, is silghtly inferior to asphalt, but very much superior to granite.

CAN BE USED ON HEAVIER GRADES THAN ASPHALT

Brick can be used on much heavier grades than macadam or asphalt, but on such monstrosities as occur in the heart of Kansas City, where the horses should have wings rather than feet, granite and cobble can only furnish the hold necessary to climb such prohibitive grades.

In comparing the cost of different wood pavements, brick stands out most prominently, and its very moderate cost for such a superior pavement is the course of its rapid growth and general adoption. For while local conditions will not only greatly modify prices, and cause the relative relations to vary, yet in a broad way it will usually be found that brick costs less than half as much as granite, about 30 to 50 per cent. less than asphalt and but little more than a first class macadam pavement. The actual cost of paving brick at the kiln varies from $6.50 to $8.50 for brick size, and $8 to $10 for blocks per 1,000. Freight will add from 75 cents to $5, and haulage from 50 cents to $1 more to these prices for delivery on the job. When laid on a six-inch concrete foundation, with a one and one-half-inch sand cushion, and a Portland cement filler, the brick laid complete will usually range from $1.25 to $2.25 per square yard, according to local conditions, for a strictly first class pavement—a pavement that approaches granite in durability, that costs but very little to maintain, whose traction, cleanliness and sanitary features are the very highest, that is free from the mud and dust and incessant heavy repairs of macadam, that is free from the slipperiness, high cost and excessive repairs of asphalt, and which is free from the noise, very high cost and defective traction of granite.

PLANNING AND EQUIPPING MUNICIPAL RECORD ROOMS

Fire-Proof Record Rooms Absolute Necessities—Irreparable Losses Through Inadequate Protection Constantly Occurring —City Officials Should See That Records Are Properly Protected

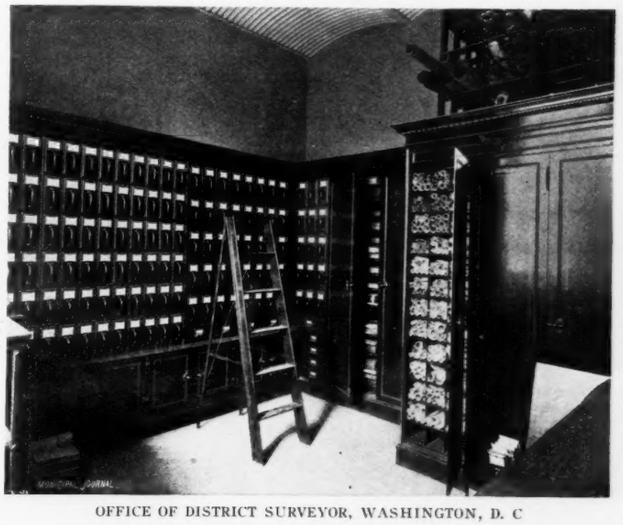
By M. S. Kelley

THE necessity for the complete protection of all municipal records is now recognized by every city. Not all have reduced it to practice. In many, public records are subjected to risks seldom tolerated in a private business. A type of some of the buildings provided for their safekeeping is illustrated in the old Registry Office in New York City. For years the chief protection of its irreplaceable contents has been the fire department. The magnificent new Hall of Records, now approaching completion, will fortunately remedy this condition. Too many instances of losses of valuable records are remembered, however, to render any discussion on the importance of the subject necessary. Evidently there is opportunity for general improvement, when as late as 1898 we find the following in the daily press regarding the loss in records of the Supreme Court at Washington: "One million dollars cannot replace them, because many of them have no duplicates in existence." It is stated that from 1736 to 1896 the records of 101 cities or towns in Massachusetts, out of a total of 356, suffered either complete or partial loss. No wonder that safe quarters for all public records is now a matter of statutory requirement in this state. In this respect New York leads all others.

The safeguarding of municipal records is a matter of interest to every citizen, and it is the purpose of this article to touch upon some essential features to be considered in the planning and equipping of record rooms for them, more particularly those to be supplied in new buildings. Some points regarding the improvement of those in older buildings may, however, first be cited.

RECORD ROOMS IN OLD AND NEW BUILDINGS

Lack of protection in older buildings is often caused by lack of room. The rapid growth of many American cities is responsible for this. The readiest and most inexpensive remedy for this condition is the construction, where possible, of good sized basement storage vaults. Older matter can be transferred to them, leaving more room for current work. This affords a good opportunity to "clean house" and discard more or less immaterial matter. Its exclusion will give increased vault space. A careful rearrangement of current work will also contribute to the same result. Fifty per cent. of crowded vaults and rooms could be relieved by a thorough overhauling, with the rejection of useless matter and a systematic and orderly rearrangement of the balance. This re-arrangement can be advantageously accompanied by the introduction of modern appliances for storing books and papers. Wood should be entirely eliminated. It



OFFICE OF DISTRICT SURVEYOR, WASHINGTON, D. C

is not only a source of danger, but from its bulky nature, very expensive in vault space. Modern devices will be found to materially increase accommodations in rooms and vaults. Boards of estimates should bear this in mind when appropriations are under discussion. More than the question of convenience enters into the matter; the feature of preservation is directly entailed. Moreover, up-to-date equipments necessitate an orderly arrangement, which is another element of preservation since indiscriminate and unnecessary handling is avoided. Uniting small adjacent vaults into one room will also afford increased space; that occupied by walls is saved; there are fewer waste corners; cases may be set in the center of rooms, and much better working quarters assured.

Careful attention should be paid to structural conditions when this plan is adopted. Walls may require reinforcing, floors strengthened to carry greater weights, and ceiling trussed to guard against danger from above.

Where it is attempted to secure purely fire-proof rooms in old buildings, care should be given to foundations. Most old city buildings are, at the best, only semi-fire-proof, and solid walls that go only to the floor, fire shutters, heavy floors and ceilings, offer only a partial protection where the whole building is a collapsible shell. Walls to record rooms in such structures should go to the ground.

This article has mainly to do, however, with record rooms in new buildings. An examination of the subject will show that it entails something more than a tentative location of rooms on new ground plans. Some structural conditions are involved requiring careful study before building contracts are let, and it is to these that special consideration is invited.

It is preassumed in this discussion that the building is to be structurally fire-proof. This does not mean a building built with hollow tile enclosing walls, open spaces under wooden floors, beams and girders left unprotected, or with their ends simply resting on masonry piers, or inserted in walls without sufficient space for their expansion.

It means a fire-proof building. Premising the building is to be so built, the points to be considered in connection with record rooms may be grouped under the following heads:

1st. Location of record rooms.

2nd. Employment of structural features of the building to secure fire-proof rooms.

3rd. Equipment of record rooms.

Obviously the first two points demand consideration *before* builders' contracts are awarded.

FIRST, LOCATION OF RECORD ROOMS

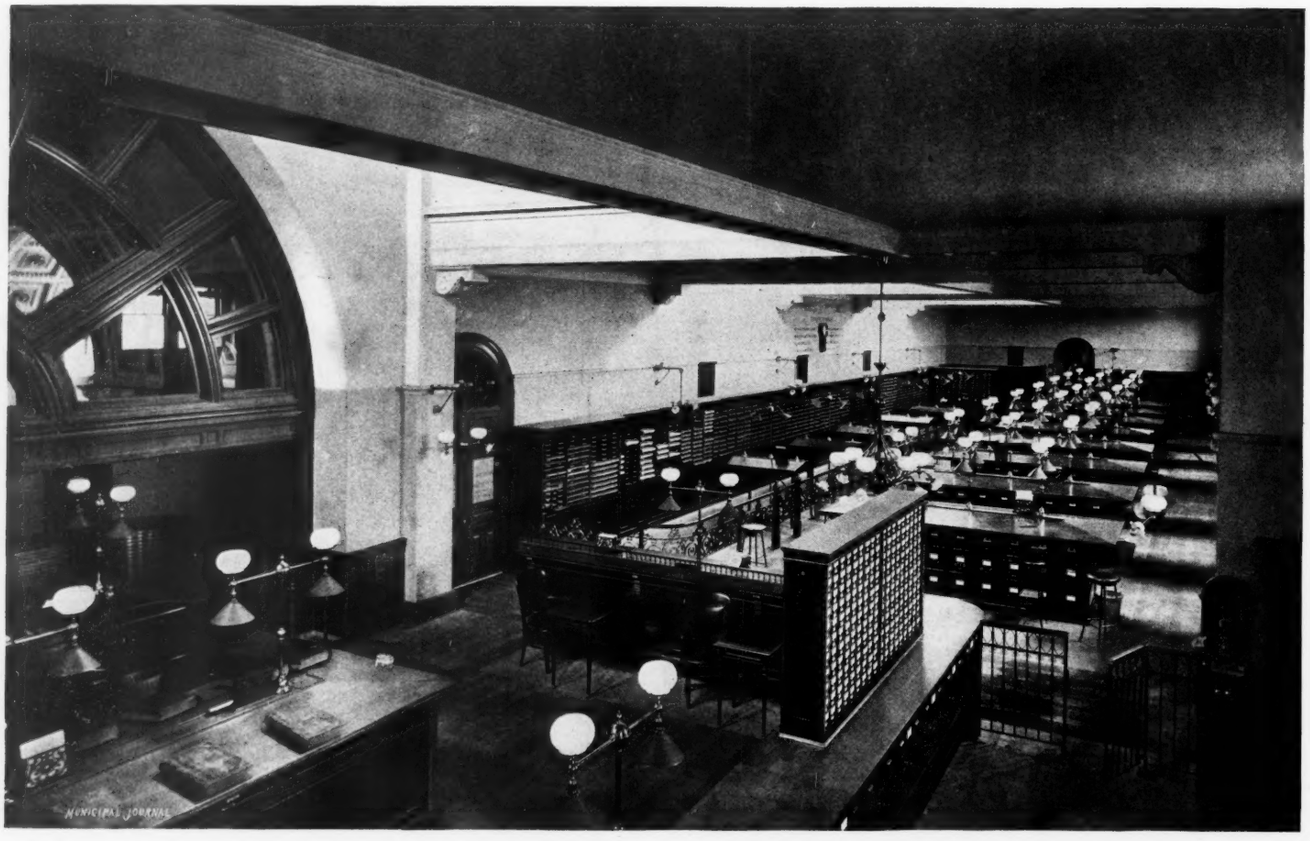
(a) Location with reference to their use by the public, etc.

(b) Location with reference to exterior conditions. That is, fire risks adjacent to any facade and the selection of those least exposed; requirements of individual departments, such as north lights for engineer's department, etc.

(c) Location with reference to the elimination of purely vault storage for certain departments and the substitution of fire-proof rooms.

This, in effect, means a consideration of location in connection with the utilizing of the structural features of the building to secure fire-proof rooms, and the investigation of the possibilities of locating them in *any* part of the building independent of vertical tiers of vaults; making the rooms vaults in themselves without their being arbitrarily superimposed in vertical shafts; and the substitution of light, airy apartments for the storage of records for close and artificially lighted vaults.

A consideration of this important point may result in a decided re-arrangement of floor space. When the necessity of rigidly grouping certain departments around vault tiers is discarded a complete freedom in locating them is obtained.



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In considering this subject the records may be divided into two classes; viz., (1) Municipal public records to be stored in fire-proof rooms; (2) Municipal financial records to be stored in vaults.

Municipal public records may be designated as those more directly used by the public; such as found in registries', city clerks', city engineers', vital statistics' offices, etc., while municipal financial records would be such as found in treasurers' and auditors' departments, etc.

The method of providing fire-proof rooms for the first class possess decided advantages. It insures better working quarters with all records conveniently at hand; a saving of space occupied by vault walls; an economy of construction; a large economy of wear upon books and documents; an economy of time, since frequent trips to adjacent vaults is obviated; economy in health secured by better light and air, and, what will be appreciated by the general public, a distinct facilitating of its business.

(To be concluded in December.)

THE SOLUTION OF CLEVELAND'S SMOKE PROBLEM

Defective Law Amended—Bureau of Smoke Inspection Established—Relative Merits of Smoke Consumers Investigated—How the Reform Was Successfully Consummated—Railroad Smoke Nuisance Abated

By Walden Fawcett

Up to a few months ago there were few cities, with the possible exception of Pittsburg and Cincinnati, which suffered from the smoke nuisance in a more aggravated form than Cleveland. In that city, as elsewhere, desultory efforts had been made to remedy the condition, but the reformers found the State statutes and local ordinances were faulty. The laws failed to distinguish between the responsibility of the owner of a plant for not providing the proper facilities for smoke prevention and that of the engineers and firemen for neglecting the use of such adjuncts. For this reason prosecutions invariably resulted either in acquittal for lack of evidence, or at best, nominal fines. Moreover, this mode of procedure engendered bitter feeling which indirectly worked harm to the cause.

In the face of this condition of things it was decided that the only feasible plan was to use persuasion and appeal to operators of power plants from the dual standpoint of civic pride and the possibility of a more economic administration of their boiler rooms if the smoke was abated. This conclusion was arrived at by a committee of the Municipal Association, a public spirited organization of business and professional men, which had been studying the question for some time. It was agreed at the outset that, in order to properly pursue the agitation, a division of municipal work should be created with that object in view and that the entire reform be absolutely removed from political influence. This was accomplished by the amendment of a State statute.

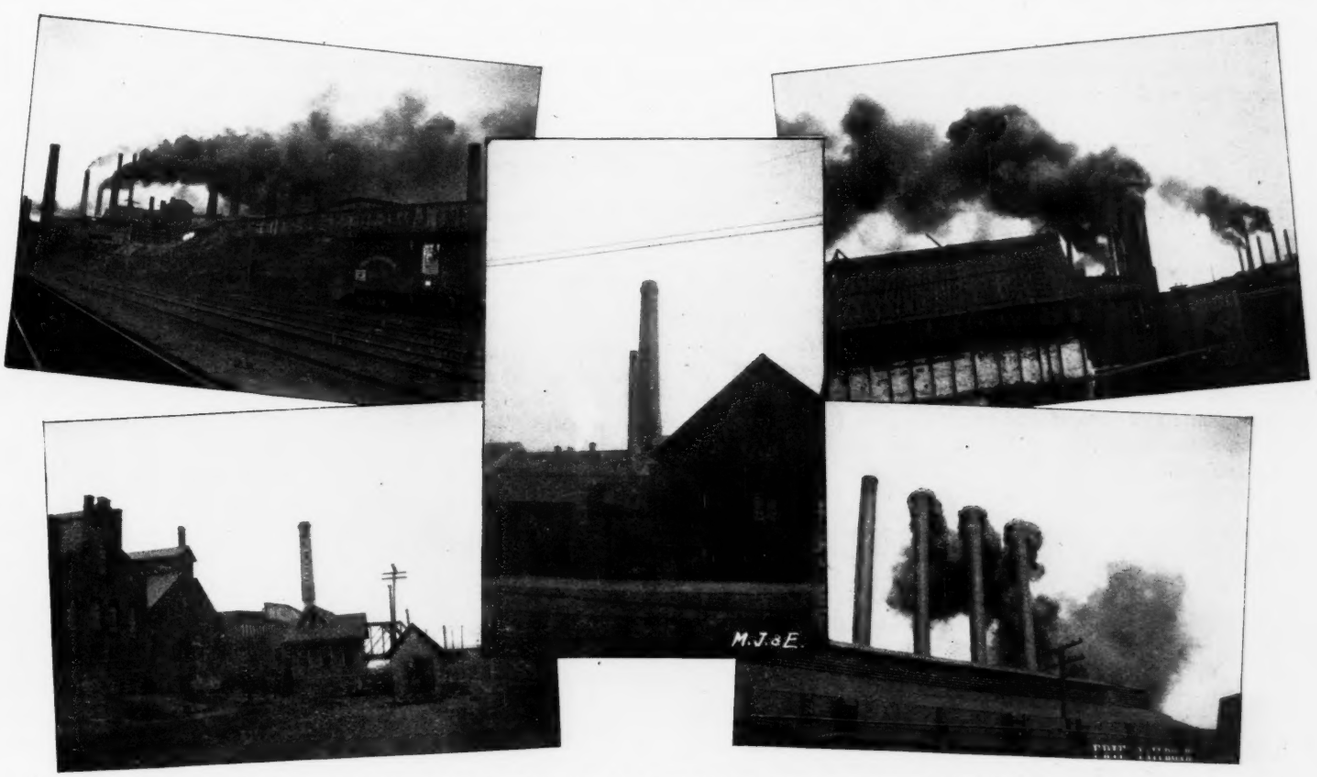
RELATIVE MERITS OF SMOKE CONSUMERS

The first action of this Bureau of Smoke Inspection, the personnel of which consisted of a supervising engineer and several assistants, was to send letters to every plant in the city where mechanical stokers or other smoke-abating devices had been installed and from the replies the officials gained an immense amount of information bearing upon the relative merits of different types of smoke consumers and their respective economic advantages which served as the sinews of war, so to speak, for the campaign against those firms and individuals which had not as yet manifested even a casual interest in the project.

In a few instances the demonstration of the advantages of the new plan, as outlined on paper, served to induce the installation of some form of mechanical stoker, down-draught furnace or steam and air jet, but in the great majority of cases more convincing testimony has been required which has constituted the chief work of the new municipal department. To put the matter in a nutshell, a meter has been set to mark the volume and density of each trail of smoke.

OBSERVATION STATIONS ESTABLISHED

The inspectors who have made these observations have had stations on the tops of lofty buildings from each of which some thirty or forty smokestacks could be observed. Observations extend over two-hour periods; notations as to the character of the smoke being made at intervals of five minutes. These observations are repeated at different times of the day so that in the end the student of any particular smokestack may, by striking an average of his various readings, have a very faithful record of the smoke producer in question.



VIEWS IN CLEVELAND SHOWING USE AND NON-USE OF SMOKE PREVENTION APPLIANCES

Duplicate copies of the report of the findings in each case have been made. One copy is placed on file in the office of the supervising engineer and the other is forwarded to the firm or individual upon whose property the offending chimney is located. Very often with the statement sent to the owner are included copies of tables of averages or percentages showing the action of other chimneys in the neighborhood. Thus the man who pleads that his neighbors are as great or greater offenders than himself, has his sole argument in favor of non-action refuted at the outset. Following the submission of such a report upon the performances of a chimney one of the inspectors invariably makes a personal call, armed with statistics designed to demonstrate the economical advantages of mechanical stokers and other devices.

SUCCESSFUL OPERATION OF THE PLAN

That this system of procedure has proven marvelously effective in Cleveland, despite the predictions of failure so freely made when the movement was inaugurated, is attested by a few statistics contrasting present conditions with those of a year and a half ago when the system went into operation. In a total of forty modern blocks within a radius of a quarter of a mile of the business center more than three-fourths are now provided with smokeless furnaces and out of a total of something over 1,600 boilers in the manufacturing district about 600 of the furnaces have been fitted with smoke consumers.

Perhaps the greatest achievement of this new branch of municipal endeavor is found, however, in the work which has been accomplished in the transportation field. None of the numerous railroads centering at Cleveland enter the city through tunnels and the Cuyahoga river, which carries an immense volume of shipping, virtually bisects the city. In consequence of these circumstances the locomotives, tugs and steamers make a very heavy contribution to the pall of smoke which hangs over the city. At first it seemed well nigh useless to invoke remedial aid in this direction.

The supervising engineer, however, detailed one inspector to devote his entire time to the railroads. This man made an exhaustive study of conditions, talking with engineers and firemen whenever opportunity offered. Then the same plan, which had been utilized in the case of power plants, was resorted to and the tabulated reports—giving in each case the number of the locomotive, the time and place of the observation—were submitted to master mechanics, road foremen, as well as to the general officials.

LOCOMOTIVE SMOKE NUISANCE ABATED

Such an impression was made that the officers of all the leading systems entering Cleveland agreed to do everything in their power to modify the nuisance and issued orders to that effect to their subordinates. It was discovered at the outset that the main remedy was to be found in careful firing. What is known as the one-shovel system was adopted on a majority of the lines. The introduction of brick arches in the fireboxes of locomotives was found beneficial, as was also the use of combustion tubes supplying additional air over the fire and the practice of leaving the fire-doors with the upper half open. The railroad officials have coöperated in the work, perhaps, a trifle more enthusiastically from the fact that it has been possible to present to them a rather more impressive showing as to the economical advantages than could be secured in so limited a time in the case of manufacturing plants. In certain instances power plants have reported a saving in fuel amounting to 10 or 15 per cent., but in the case of the railroads the result has been even more surprising.

Obviously the crusaders against the smoke nuisance in Cleveland have had to exercise a rather conservative policy in the matter of recommendations of smoke consuming devices, but nevertheless they have not hesitated to give inquirers the benefit of their judgment and particularly has this been the case when a firm or individual erecting a new building expressed a willingness to install smoke-consuming apparatus. Prof. C. H. Benjamin, the Supervising Engineer, is exceptionally well fitted for the position which he occupies and perhaps the most conclusive testimonial of the wisdom of his selection is found in the work which he has accomplished.

THE GOOD ROADS SENATOR OF MICHIGAN

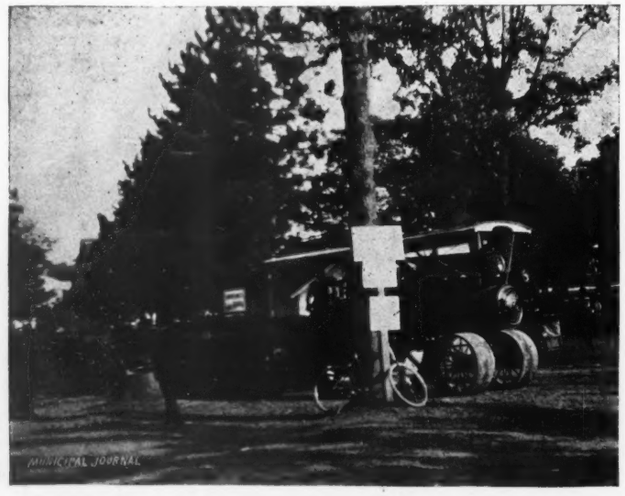
Creates a State Department for Promoting Better Highways—Enlists the Assistance of Road Machine Makers—Built a Sample Road at Hillsdale Fair Last Month

By W. R. Somers, C. E

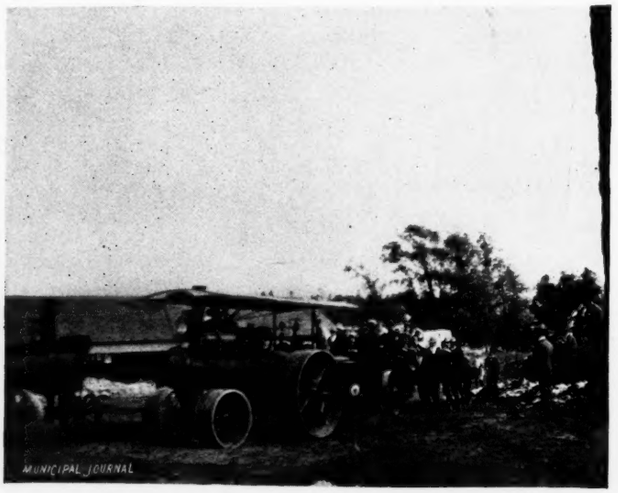
If every state in the Union was blessed with an enthusiast on good roads who had half the spirit and energy of State Senator Earle, of Michigan, the resultant work of the next decade would bring about marvelous changes in the public highways of the United States. Senator Earle is a man of medium height, wiry frame, of pleasing address, a good story teller, and has a forceful way of putting things. He not only believes in his subject, but is full of it. Among the world's workers there is no one who is doing more for the cause of better

CALLS THE FIRST INTERNATIONAL GOOD ROADS CONGRESS

It is well to remember that the first International Good Roads Congress was held at Port Huron last year, under the leadership of Mr. Earle. Since that event more than a half million dollars have been appropriated for the improvement of Michigan highways, as one of the direct results of the movement started at that time. The work planned for next year was fully described in the October number of The Municipal Journal.



GOOD ROADS TRAIN ON EXHIBITION AT HILLSDALE FAIR



TRACTION ENGINE DRAWING STONE TO BE CRUSHED AT HILLSDALE FAIR

highways, and he is a man who does things. He has set his heart on having a well organized, thoroughly equipped Highway Improvement Department as one of the functions of his State Government, and it is safe to say that the next Legislature will follow the lead of the Senator and pass the creative act which will make this possible.

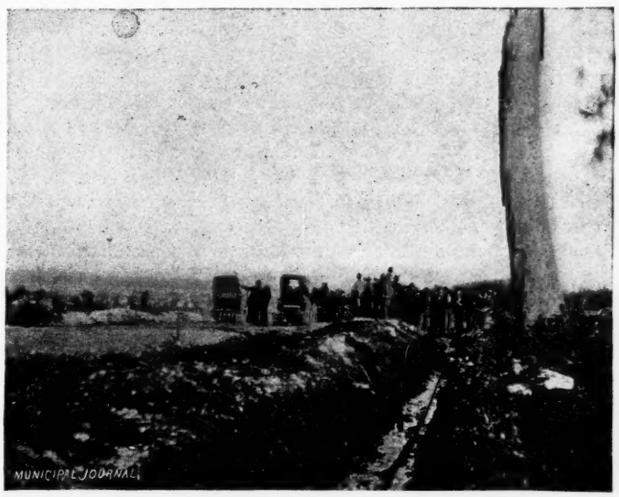
The Senator's method of improving the highways of a township is to take the worst piece of road to be found within a given town and improve it one season, and so on through the successive seasons till all the roads are improved. He likes nothing better than to be shown a piece of road so bad that the farmers all tell him that it

is impossible to better it, or even make it passable during the wet seasons of the year. Some farmers who lived along what is knows as the Leelenaw road, about two miles out of Traverse City, said they could show him a piece of road, about a mile in length, which they would defy him to better. He took the dare and went at it. Upon investigation he found that the piece of road in question led over a hill with about a 6 per cent. grade, and was full of springs. It was so muddy in the fall and spring that it was utterly impossible to draw a load down the hill, much less up the hill.

HOW THE SENATOR MADE A BAD ROAD GOOD

The farmers who had worked the road had gone at it in the usual way, simply turnpiking it, making no particular effort to ditch it properly and never dreamed of draining it. After diagnosing his case, as every doctor of good roads is bound to do, the Senator not only turnpiked the road, but all along the wet portion he had ordinary tile laid from the centre of the road in a diagonal direction to the well constructed ditch on either side. The result has been all that could be desired, for it is now a first class road in every respect, and for the first time in its history is usable at all seasons of the year. It shows what the mixture of a little gray matter, common sense and energy will do when applied to the improvement of a bad piece of road.

Senator Earle is by no means a novice at road building, for he was connected with the Department of Public Road Inquiries for several years prior to his election as State Senator. In this way he has gained a large amount of valuable experience and a knowledge of

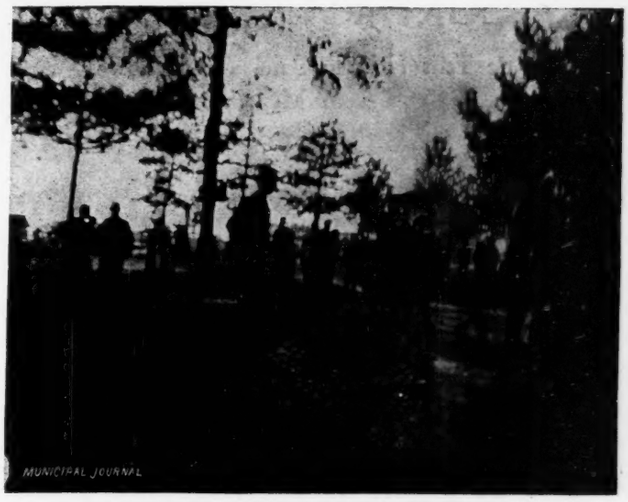


THE BAD PIECE OF ROAD DOCTORED BY SENATOR EARLE AT LEELENAW

what kind of machinery could be employed to the best advantage. He has devoted a large amount of thought and time to the perfecting of machinery for this work, in which he has been greatly assisted by the Port Huron Engine and Thresher Company, of Port Huron. At his suggestion this company has expended several thousand dollars in experimenting upon machinery suggested by him, and as one of the results, succeeded in producing the only dirt loading elevator or turnpiking road machine made, as he calls it, which is attached to a traction engine. This machinery was placed at the disposal of the Senator, and will be run under his direction during its tour of the State next year.

BUILDS A SAMPLE AT HILLSDALE FAIR

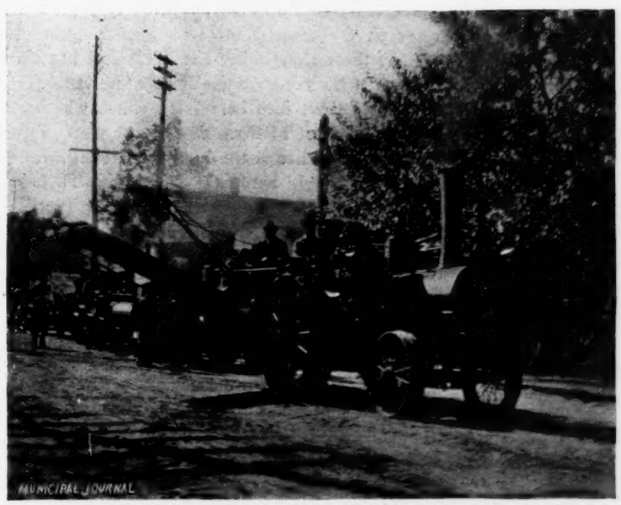
The last sample of road built under the direction of Senator Earle was at the Hillsdale County Fair, from September 30 to October 4, inclusive. October 3d was Good Roads Day, on which there was the largest attendance of any day during the fair, 45,000 admission tickets being received at the gates. The work of constructing this sample road is shown by the accompanying illustrations. The outfit which built this sample of road is one of the most complete that has ever been employed in the improvement of a highway. The traction engine drew the stone and afterward furnished the power for running the stone crusher, and also operated the stone spreader. The



THE STONE CRUSHER AT WORK AT HILLSDALE FAIR

latter machine worked to perfection, according to the Senator, laying the stone four inches thick and four and one-half feet wide. It placed the crushed stone just where they were needed on the road, so that it was hardly necessary to use a rake on the job. The machinery used was made by the Port Huron Engine and Thresher Company, of Port Huron, Mich., and was sent to the fair to perform this work without any expense to the Michigan Highway Commission, under whose auspices the road was built.

The sample road was made in three courses, the first two consisting of four-inch mill run stone, which were bound with a layer of gravel. The Senator does not advocate the use of gravel as a binder, but as this stone was crushed before he arrived and neither sorted nor screened, he had to do the next best thing and use the gravel. In speaking of the result the Senator said: "This sample of stone road is the first foot of modern improved road which has been built in Hillsdale county. There is no earthly reason why more of it should not be constructed every year from now on, for there is abundance of material in the hard heads scattered about the fields. I do not believe that the will, energy and enthusiasm necessary to the carrying out of large plans for highway improvement in this and other counties in the State of Michigan will be lacking, for, thus far, the citizens of the Peninsula State have taken up the work with a rush which augurs well for the cause of good roads. I wish to express my appreciation of the assistance which the MUNICIPAL JOURNAL AND ENGINEER is giving to the cause, not only in the State of Michigan, but throughout the country. Its aid is well directed, helpful and efficient. I find in my travels about the country that every good roads advocate is glad to read the magazine and to benefit by its hints and suggestions, as shown by its splendid descriptions of the work in other fields."



DIRT ELEVATOR RUN BY TRACTION ENGINE AT HILLSDALE FAIR.

CONNECTICUT VALLEY HIGHWAY ASSOCIATION

Senator Earle Tells How to Build Better Roads—Westfield of Forty Years Ago and Today—Better Roads Needed—Massachusetts Furnishes Object Lessons—Resolutions Adopted

By Our Special Correspondent

Good roads enthusiasts from Massachusetts, Michigan, Wisconsin, New Jersey and New York gathered at Westfield, Mass., on October 9, for the fourth annual field-day of the Connecticut Valley Highway Association. The primary object of these meetings is to disseminate the knowledge of good roads, both in relation to their construction and also as their value to the country. Representatives from all walks of life assembled at the Gem Opera House in Westfield, and among these were many of the prominent good roads advocates and builders from out of the State. The Westfield Board of Trade, under the general direction of Mr. James H. Bryan, had charge of the local preparations. After an excellent dinner, the business of the meeting was taken up.

Col. W. L. Dickinson, who is the president and founder of the association, acted as master of ceremonies and first introduced Mr. R. J. Morrissey, chairman of the board of selectmen, who welcomed the guests in behalf of the town. Among other things Mr. Morrissey said that, while Westfield had good schools, flourishing industries, etc., good roads were sadly lacking, and that no town could be up-to-date unless it had well constructed and well cared for highways. President Dickinson, of the association, then briefly outlined the object of the meeting. He said that the cost of poor roads is excessive and no community could afford to have them. The benefits from good roads have been fully demonstrated in progressive states, and the benefits derived greatly outweigh the cost. In a few years, if all worked with a will, this country would have the best system of good roads in the world.

MICHIGAN FARMERS BACKWARD

Senator H. S. Earle, of Detroit, Mich., president of the League of American Wheelmen, then addressed the meeting. Senator Earle, during the course of his address, told several amusing stories to illustrate how backward the country people are in not seeing the value of good roads. His subject was "Better Roads. Why? How? When? Where?" The ancients wanted better roads so that they might use them for their armies of conquest. Why England wanted better roads was for a better reason—that as much as possible of the cost of transportation should be eliminated, and with her better highways she placed her factories upon the docks. The cost of carrying her goods over her stone roads is as nothing compared to what it costs the people of the United States. Senator Earle gave three reasons why the United States wanted good roads. To eliminate all the possible cost of transportation of crops and manufactures; to better educate the children by allowing them to go further and so to better schools; and to make association easy. He spoke of some of the things that it was necessary to rid ourselves of before there were possible better highways in the United States. New England has freed herself from some of these things, but the West still has them. The first is the path-master, who superintends the statute labor. The Senator suggested that they be put into barrels of cider, which it is desired to keep sweet, for the most of them would not work nor let the cider. Another class the West has is the kind of persons who believe that to build stone roads would bankrupt the nation. This class will be found among the farmers, in Michigan especially. In that state five-twelfths of the assessed valuation of the State is farm property, four-twelfths municipal and the rest corporation. The last two elements are unanimously in favor of granting State aid for building stone roads, but the farmer element in the legislature blocked every bill that had for its purpose taxing the whole community for highway construction, so the farmers are still paying the whole bill of building roads.

HOW TO BUILD BETTER ROADS

As to the question how better roads can be built, Senator Earle suggested several ways. First, to plant corn in the land set apart for highways and use the proceeds of the sale of this for road building. Next, plant trees along the land intended for the road, and, when these have grown sufficiently, cut them down and sell them and build the road with the money. Still another and quicker way would be to invite the Carnegies, Vanderbilts and Astors to endow certain highways and call them after their donors. Senator Earle then suggested that an internal revenue tax of $1 be placed upon every seat in every vehicle in the United States and claimed that at least $75,000,000 could be thus raised, without any burden on the people. Add to this the United States convict labor, guarded by the army in time of peace. Thus would be built one of the five kinds of roads in the country, viz., the government. The next kind of road is the State road, built by State tax, and with stone crushed by State convicts. As the annual amount of work performed by convicts in the United States is equal to 36,000,000 days' work, and as 2,000 days' labor is sufficient to build a mile of road, 18,000 miles of road could be built by convicts every year. The next road is the county road, to be constructed by local taxes and county convicts. Then come the town and district highways which need not be built of stone.

WHEN GOOD ROADS WILL BE BUILT

As to when better highways will be built. It would be when the Senator persuaded the post office department and road inquiry department at Washington to do as he asked them. This is to take a census of the roads every five years. The League of American Wheelmen has asked the post office department to send out a card dotted in quarter-mile sections to represent a 20-mile quarter-section to every postmaster in the United States, to put a ring around the center dot which shall represent his post office, making out as near as possible a map of the roads in his section leading out to the neighboring post offices. These roads to be made in three colors, red for good roads; blue, for medium, and black for poor. These cards to be turned over to the road inquiry department, which should be turned into a bureau of information, for them to consolidate into maps with sections one hundred miles square. These to be printed and distributed to the postmaster in the one hundred miles square sections all over the United States, to be for sale at the stamp window at five cents each. Then buyers of land in any locality will be able to see what kind of roads there are in the place before settling there. The answer to the question as to when better roads will be obtained will be when those who have roads marked black are able to get the next census of the roads to describe their roads as red.

WESTFIELD'S ADVANCE

Henry W. Ely, Esq., a lawyer of Westfield, was the next speaker. He spoke of the project to better the roads in and about Westfield. His comparisons of the Westfield of 1860 and of to-day were of great interest to his hearers. He said that in 1860 the population of Westfield was 5,055, the assessed valuation of the town was $2,801,854, and the total value of the schoolhouses and school lots was $11,995. There was but one mile of sidewalk in the town and there were no sewers, water, gas, street lights, police or firemen. The town property itself did not exceed $30,000, while its debt was $62,000. In 1901 the population has increased 120 per cent., being now 12,300, the assessed value is $8,250,867, and the total cost of the schoolhouses and school lots about $175,000. There are twenty-eight miles of walks, a sewer system costing $150,000 and a water system worth $600,000. There is a $50,000 fire department, a gas and electric plant valued at $160,000, the town property is worth $4,160,000, and the debt is only $275,000; $36,000 has been spent in paving streets, and three and one-half miles of road have been macadamized. These figures convey no idea, however, of the change that has taken place in the comfort, health, education and progress of the people. Heretofore is was a day's journey during the winter from the depot to the post office. There is scarcely an employed family in the town that does not live better and happier than any family could live twenty-five years ago. Similar conditions prevailed in all country towns. Formerly people had the idea that it was economy to keep all that it was not absolutely necessary to spend. This is false economy. In measuring the cost of improvements

not only the dollars and cents must be taken into consideration, but also the advantages in a business way. As in the case of the water system the value of it is not measured by its cost in dollars or what it would bring if sold, but by the fact that not an inhabitant in the town would be without it at any cost. It seemed to him to be good business policy to spend of what one earns all that is necessary to obtain the wants of life, including all that which conduces to one's health, comfort, education and legitimate pleasure.

NEEDS BETTER ROADS

The town of Westfield, Mr. Ely went on to say, was sadly in need of improvements. Chief among these was good roads. For several years the town has recognized this necessity by appropriating annually from $7,000 to $10,000 to that end. No one would think of exchanging the present pavement that has been laid for twice the thirty-six thousand dollars that it cost. Hard earned money has been spent for this work, but value received has been ten-fold. Good, sound, smooth roads, kept clean, promote public health. No farmer can afford to be without them. A little more taxes, but heavier loads moved more easily and with less power. Then, too, under the system of centralized schools the children have to be carried long distances and are entitled to such roads. The $100,000, if it will cost so much to put the roads in the proper shape, will come back to the town in many-fold and many ways.

STATE FURNISHES OBJECT LESSONS

Mr. W. E. McClintock, of the Massachusetts State Highway Commission, was then called upon to speak, and he began by commending the financial statement of Mr. Ely as a solution of the road question. Heretofore the farmers in Massachusetts were opposed to good roads. Now every farmer and business man is in favor of them. He said that now pieces of road had been built for $2,500 per mile. The object of the commission was not only to build good roads, but also to furnish object lessons to town and city authorities. A significant fact in connection with the growth of good road sentiment is that in 1893 there were but twenty-five steam rollers in the State, while at present there are 150, and these are working overtime. There are also now ten times as many plants for crushing stone as there were eight years ago.

RESOLUTIONS ADOPTED

When Mr. McClintock had finished his address, Enos Boise, of Blandford, presented the following resolution, which was unanimously adopted:

Whereas, One of the great economic issues of the day is the improvement of our highways, and

Whereas, The Road Inquiry Department at Washington has been crippled by a small appropriation and has been compelled to depend upon the contributions of road machinery companies and philanthropic individuals for sufficient funds and men to carry on a traveling school of instruction, and

Whereas, The Connecticut Valley Highway Association considers this policy as unwise and against the public interest, therefore be it

Resolved, That the Connecticut Valley Highway Association recommend to the 57th Congress the desirability of appropriating for the year 1902 the sum of $500,000 for the road inquiries department to enable said department to buy sufficient machinery and build railroad cars to equip a train as a school of instruction, and that said train tour the country for the purpose of demonstrating the art of road building.

Mr. S. C. Carr, master of the State Grange, of Wisconsin, spoke on the roads in that State and of the opposition of the farming element to any expenditures in improvements. The engineering department of Boston was represented by Mr. Henry Manley, who said that the only way to get good roads was to spend money on them. Next it was necessary that some one be elected to spend the money wisely and some one to build the roads who knew how.

Another speaker was Mr. F. A. Dunham, of Plainfield, N. J., who impressed upon the assembly the necessity of taking advantage of material on hand, and cited in illustration some work that had been done in Tennessee in which eighty miles of road had been built at a cost of only $110,000. The most important point was to agitate the question and stir up public interest and activity.

ENGINEERING PHASES OF HEALTH BOARD WORK

Not Widely Understood—Bad Laws Prevent Good Work—Various State Laws—Plumbing, Drainage and Garbage Regulations—Common Sense in Abating Nuisances

By Marshall O. Leighton*

A LARGE mass of the American public knows nothing concerning the functions of a board of health. The individuals of this mass have, perchance, heard of such an institution, but have no idea of its influence for good or bad. Another section of the population has become acquainted with certain of a health board's powers by reason of the application of some of these powers to itself. Such individuals believe that the legally constituted sanitary authority is an established body, the principal business of which is to meddle with the private affairs of citizens within its official area. A constantly growing mass appreciates fully the importance of the work of a board of health, but its information is extended along lines purely biological. Comparatively few have been brought in contact with the engineering phases of sanitary work in American municipalities.

THE WORK NOT WELL UNDERSTOOD

It is not surprising that the biological side of the work is more familiarly known to the greater part of our well informed citizens. The name "Board of Health" is an immediate reminder of matters medical, physiological and hygienic. In nearly every case where public attention has been called to sanitary work the subject of discussion has been some epidemic of disease or certain conditions leading to it. Usually and properly, the commissioner or executive officer of the board of health is a physician, and with such persons we associate disease, distress and physic. No one, however, appreciates more fully than the medical officer of health that there arise in his early experience conditions and crises not dealt with in his medical text books, and he is obliged in the end to take into his confidence the engineer.

The public health has a despotic creed, and the curriculums of universities have been obliged to undergo modification in order that there may be fashioned individuals who can associate engineering formulæ with biological necessities. He who is not well-informed in the science of hygiene is an incomplete engineer; preventive medicine is fast becoming an accompaniment of the surveyor's level. So we have constructed the sanitary engineer, and he is one of the component parts of a board of health.

DEFECTIVE LAWS PREVENT PROPER CONTROL

It is generally admitted that a board of health should have control over matters which is effective in the maintenance of public health. This means that the supervision, maintenance and regulation of public systems which have been established by reason of an hygienic necessity should be vested in that body. Unfortunately, such is not generally the case. The legislatures of different States have delegated to separate municipal bodies the administration of matters which are wholly within the sanitary province. In one State it is the regulation of plumbing construction; in another it is the collection and disposal of garbage; in a third it is the milk supply and so on until retrospection shows that there is little uniformity in the powers of boards of health in the different States and provinces in this hemisphere. In discussing here the different phases of engineering work I shall include those which seem to me to be properly within the powers of a sanitary authority. I know of no established board whose

* Consulting expert, Montclair, N. J., who read this paper before the eighth annual meeting of the American Society of Municipal Improvements, held at Niagara Falls, N. Y., October 1 to 4, 1901.

province includes them all, and I recognize that many wiser heads than mine will disagree with me when I say that every board of health should be possessed of each of them. There are many excellent instances in which sanitary work has been done by separate commissions, yet I am bound to believe that it could have been handled by those same officials with more universal satisfaction and profit had they been directed by a body which from its very construction must have an eye single to the betterment of health.

A glance over various laws in some of the representative States of our Union will reveal certain engineering duties which are thrust upon municipal boards of health. It is apparent at once that the regulation of plumbing, drainage and ventilation are included within the powers of many boards, and that these powers do not extend simply to the framing of regulations concerning those subjects, but involve a thorough knowledge of them from the engineering standpoint, so that intelligent inspection of work may be accomplished and advice given concerning the correction of defective systems.

LAWS OF VARIOUS STATES

In New Jersey an act was passed in 1888 reading partly as follows: "Section 12. That the said local boards of health shall have power to pass, alter or amend ordinances and make rules and regulations in regard to the public health within their several jurisdictions for the following purposes:

"VIII.—To secure the sanitary condition of tenement houses, jails, prisons and all public buildings."

A supplement to this law reads as follows: "That local boards of health, except township boards, shall, in addition to the powers enumerated in the act to which this is a supplement, have power to pass, alter or amend ordinances and make rules or regulations within their respective jurisdictions.

"To compel, prescribe, regulate and control the plumbing, ventilation and drawings of all buildings, public and private . . . and require plans with necessary drawings or descriptions to be submitted to said boards for inspection and approval.

"To secure the sanitary condition of all buildings, public and private."

The health laws of Ohio give to municipal boards the following powers: "When any building erection, excavation, premises, business, pursuit, matter or thing, or the sewerage, drainage, plumbing or ventilation thereof is, in the opinion of the board of health, dangerous to life or health . . . the board of health may declare the same a public nuisance, and may order the same to be removed, abated, suspended, altered or otherwise improved . . . and the refusal or neglect to obey such orders shall be a misdemeanor punishable as hereinafter provided."

In Wisconsin the law reads: "Every board of health may take such measures and make such rules and regulations as it may deem most effectual for the preservation of public health." This is probably the broadest statute defining the powers of a local board of health which we have in this country, and its application can be extended to include engineering work of almost any character. The omnibus term "dangerous to public health" is an expression which gives almost limitless powers, and is defined only by a concert of eminent authorities and can be expanded to fulfill conditions and circumstances most convenient in the carrying out of sanitary work.

In a model ordinance carefully drawn up by the State Board of Health of Illinois, to conform with statutory limitations and examined and approved by eminent legal opinion, we find the following: "Article III. Section I. That whenever it shall come to the knowledge of the board of health or of its officers or employees that the condition of any building or premises is injurious to the health . . it shall be the duty of the medical health officer or sanitary policeman to make a thorough examination of the building and to direct and instruct as to the remedy of such condition."

Again in "Article VIII. Section I. To make regular inspection of all school buildings and premises as to their hygienic condition and report . . . with instructions as to the remedy of conditions (if any are found) whereby the health of those in attendance may be impaired or life endangered."

THE REGULATION OF PLUMBING

These brief quotations from the laws of a few of our States show to some extent how wide are the possibilities for engineering workers in boards of health. It may be pertinent to discuss briefly a few of the branches which are taken up by some of the most representative health boards.

The most familiar engineering work of a board of health is the regulation of plumbing. In some places the rules covering this are extended to embrace the sewerage system itself; in others the house laterals from the sewer to the house-tops are included, while there remain codes which seek to regulate only the construction inside the basement wall. When cesspools or local systems of sewage disposal are constructed, I believe it is always the case that such construction is under control of the health board.

Physiological research has shown that the air from sewers is not the deadly poison that it was once supposed to be. Indeed, it has been demonstrated that the air from some sewers which are in constant use, is far more wholesome than that lying over some streets or confined in some houses. These observations have not, however, resulted in any relaxation of efforts to improve plumbing. While it is extremely doubtful if specific diseases are transmitted by means of defective drains, it is manifest that it may have predisposing effects upon those receptive individuals who compose the greater part of our population. Good plumbing is none the less desirable and necessary because poor plumbing has been found to be less deadly than has been popularly supposed.

The greatest need in the regulation of plumbing is uniformity of requirements among the municipalities of the country. A glance over the plumbing codes of various cities shows that ideas of proper construction differ widely. In many places, the principal object seems to be to make plumbing as complicated as possible. There has arisen among sanitarians a terror of a common physical phenomenon called syphonage, and the apprehension which it causes has led to the establishment of regulations which, when carried out faithfully, make of what should be a simple, carefully aligned system, nothing more than a labyrinth of iron and lead pipes, which violate every established principle of good mechanics. One board finds especial danger in the use of a certain device, while another sternly demands that it be used on all occasions; a third will rest secure in the existence of a "main house-trap," while a fourth will tolerate it under no circumstances. So we may pass from one code to another until we wonder how a mechanic can work intelligently in more than one town.

Coincident with uniformity, we hope for common sense. It is very rare in any work that a hard and fast method of procedure can be made to apply to every case. Rules of construction, however rational and practical they may seem at outset, must be modified to a greater or less extent in actual practice. Here it is that a board of health must stand in the position of consulting engineer. It becomes necessary to determine each course to be pursued in each of the cases dealt with, and naturally the board becomes the court of appeal. Too often, I may say, this court is impractical; it is bound by theories which have never been properly applied, and prejudices which will not stand the test of close observation. A commission of qualified authorities which would examine into the practice of plumbing, throw into discredit some of our false notions, and place before us a rational plumbing code, would render great service to those who are seeking the advancement of municipal improvement.

THE IMPORTANCE OF DRAINAGE

In our older thickly-settled cities, the question of drainage was settled before boards of health took the place which they now occupy. In suburban quarters, especially, those with no system of sewerage, health boards are called upon to deal with important drainage questions which are distinctly engineering in their character. It is generally the law that systems of sewage disposal for single houses must be constructed in a manner satisfactory to the local sanitary authority. This is proper and necessary, for without it we find that cesspools are set in swamps, overflow pipes in the drainage area of wells, and private sewers laid without regard to grade or outlets. Some one in authority must know how certain systems are adapted to certain soils, how filtration may be affected by local conditions, and be versed in many other matters, in order that the boards which he represents may adjudicate wisely in each individual case. The regulation of plumbing, then, must carry with it a pre-supposed insight into many important engineering questions.

The drainage of wet, rotten and spongy land, and the divergence

of surface water from places in which it does damage to other and proper courses is often a perplexing problem for boards of health to meet. The Massachusetts law gives local boards power to drain such lands if the expense therefor does not exceed the sum of $2,000. It is often the case that the proper method of treating a particular case is in serious dispute, and there are grave doubts as to whether one method or another is preferable. Such work is purely that of an engineer, and yet it often becomes the duty of a board of health to perform it.

PUBLIC HEATING AND VENTILATION

Problems of heating and ventilation occupy the attention of many health boards. In school rooms, dormitories, tenements, public halls and places of confinement there has been in the past, and is even now a great need for reform along the line of ventilation. Few questions in hygiene are more strenuously discussed and disagreed upon than this. But whatever else may be at issue, I think it has been thoroughly admitted that no settled method of procedure will be successful in all cases. The peculiar conditions attending upon each special case make it necessary that the board of health should have a thorough insight into the minute questions of ventilation. Excellent work along these lines has been performed in various cities under the direction of boards of health, notably in Washington, D. C., by Dr. William A. Woodward, Health Officer; in Providence, R. I., under the direction of Dr. Chapin, Superintendent of Health, and in other well-known localities. The work done with reference to school ventilation has been extremely beneficial from every point of view, and the determination of the best method for ventilating schools has been materially advanced thereby.

ABATEMENT OF NUISANCES

The abatement of nuisances brings out numerous engineering problems which require intelligent treatment. It is necessary for the sanitary authorities to have proper ideas concerning the remedy for each nuisance, and to intelligently pass upon plans brought forward for its abatement. A foul industrial odor may pollute the air of a neighborhood, or the smoke from a factory may be a damage to health and property. It is first necessary to ascertain whether or not such a nuisance is amenable to treatment, and although it may not have the duty of prescribing the means by which it may be abated, it must, nevertheless, have a clear understanding of how relief can be obtained in order to properly pass upon the efforts made in that direction. I will relate the facts in a pertinent case which came under my observation.

In a factory, in a certain municipality, a process was carried on from which it was necessary to discharge as waste a certain mixture which, upon standing for several hours partook of the consistency of gelatine, and there occurred a subsequent putrefaction, from which arose an odor most overpowering. The substance was a manufacturing waste which must ultimately be disposed of by the way of the sewer. The company therefore entered their waste pipe into the sewer, with results which were soon apparent. Upon reaching the sewers it immediately collected along the inside thereof for more than a mile, and, in the course of time, had filled the pipes half full of a reeking mass of the consistency of putty, the odor from which threatened to depopulate the houses in the vicinity of each manhole. It would, in time, have filled the sewer completely.

Upon investigation the officials of the company found that every other factory of the same kind in America was situated so that it discharged its waste into a large body of water, and that there had been absolutely no experience with this kind of refuse in sewers. There being no precedent for the company to follow in dealing with the trouble the officers threw the case back upon the mercies of the Board of Health, stating that it was ready to go to any expense to remedy the trouble if any one would show them the way. Under such circumstances the only thing which could reasonably be done by the board was to inaugurate a series of experiments with the waste in question, and devise some method of treatment. Accordingly, the work was taken up, and after considerable study and experimentation a plan was formulated which has worked in a satisfactory manner ever since.

GARBAGE DISPOSAL

Engineering work falls to the lot of the board of health in connection with garbage disposal. In the majority of cases in large cities the actual work of selecting a particular kind of disposal works and the maintenance of the system is delegated to a special department. In such cases, however, it seldom fails that the health authorities are consulted in the beginning, and have a powerful influence in guiding the trend of affairs in the inauguration of a system. It is very seldom, indeed, that the counsel of a competent board is disregarded in such a preparation. Having established the system it is true that, in numerous notable cases, the management is given over to the board of health. When this is not the case the sanitary control of the collection falls under the guidance of the health board. We have seen many instances in which a board has been called upon to pass upon the merits of systems in use by reason of complaints from citizens living in the vicinity of the disposal works. This is a grave responsibility which must be dealt with wisely. Having a system in operation for which the municipality has paid full value, it remains for such board to determine whether the system is or is not a proper one. The first step, that of determining whether a nuisance is present, is not an engineering question, but having determined that such is the case, the question of abating it without actually abolishing the whole system makes it necessary that the available information concerning garbage plants be at the disposal of the board. There are numerous points which can be thoroughly appreciated by this audience which must be considered, and which put upon the board engineering responsibilities which do not appear upon superficial consideration.

In smaller municipalities the inauguration of the whole system is often put in the hands of the board of health. This means that careful account of each system proposed should be taken and all the attending details should be worked out. These remarks apply also to a large extent to the establishment of systems of water supply and sewage disposal.

UNIFORM MUNICIPAL ACCOUNTING

A Practical Application to City Comptrollers' Reports—Chicago to Have New System of Accounts—Applied to Newton, Mass.—Every City Has Its Own System—Difference Between Municipal and Commercial Bookkeeping

By Harvey S. Chase, I. P. A*

THE title of this paper was selected because I desired to emphasize the first word of it, "practical," and, because, in so doing, I hope, in some measure, to bring the matter of so-called uniform accounting for cities down out of the clouds and to take one of the steps necessary to establish it firmly upon the earth, where we all are agreed there is immense and constantly growing need of it.

A PRACTICAL APPLICATION

To be practical, in a paper of this sort, one must necessarily be as brief as is consistent with clearness; therefore I will omit all arguments in favor of uniform accounting and go on immediately to the question of application of such a system.

The difficulties, in the way of such application, are many and sometimes they have appeared insurmountable; in fact, they still appear insurmountable to many intelligent and able city comptrollers who are up to their eyes in their own city's affairs and look with natural distrust upon any ideal, or theoretical, system from outside.

The accounting system in each city of this country has apparently "growed" with Topsey; and, owing to the immense number and complication of municipal accounts, any scientific reorganization of the methods, books, etc., has rarely been attempted. The proposition is too big a one to tackle, if it can be avoided, by those in office, whose daily life is already full to overflowing with the cares and responsibilities of making the city's affairs "go" and the ends meet; but now and then, owing, either to the absolute necessity brought about by the overwhelming growth of the city, or to the intelligence and broad public spirit of those in control of the government, such a systematic reorganization is undertaken amid circumstances which are favorable to its acceptance and adoption. Such an example of practical application of theoretical principles is now going on at Chicago, where Messrs. Haskins & Sells of New York have begun on just such an undertaking, and the writer has been retained as a consulting expert to assist in this matter.

TO IMPROVE CHICAGO'S SYSTEM

It is Messrs. Haskins & Sells' intention to lay out the Chicago system in an original and up-to-date, yet thoroughly practical manner, and to spare no labor, or pains, in making for Chicago a model of what a great city's accounting system should be; one, which they are hopeful can hereafter be studied with advantage by comptrollers elsewhere, who are anxious to profit by the great amount of expert work which must necessarily be applied to Chicago's affairs during the coming months.

This matter has been mentioned to show the "practical" and immediate nature of uniform accountancy.

For arguments upon the necessity of uniform accounting I would refer to the "Proceedings of the National Municipal League," whose secretary's office is at the Girard building, Philadelphia, and whose "Committee upon Municipal Accounts and Statistics" embraces quite a number of recognized experts upon municipal affairs. Associated with the committee are a dozen or more similar committees of the various national organizations, Water Works, Gas Works, Electric Light, etc., including the committee of the League of American Municipalities, and the work of these committees is the basis upon which the outline in this paper mainly rests.

* Mr. Chase graduated as Mechanical Engineer at Massachusetts Institute of Technology, Boston, in 1883. Then entered the cotton mills and print works at Manchester and Great Falls, N. H. He was made superintendent of exterior work, including the water works and the gas works. Under his direction these works were rebuilt and became dividend-paying enterprises. He was made treasurer of these corporations. Later, the auditor of various corporations in New York City, and soon after took up the profession of public accountancy, establishing an office in Boston. Mr. Chase is secretary of the "Incorporated Public Accountants of Massachusetts," an incorporated association of the notable public accountants of that State, which corresponds with the Society of Certified Accountants in New York.

EVERY CITY HAS ITS OWN SYSTEM

It is evident, in the first place, that no two cities' accounts are alike and it is improbable that they can ever be made alike; that is, identical, or nearly so, in titles, arrangements, books, etc., etc., owing to essential differences in the laws and ordinances by which they are respectively governed. The ordinances can be comparatively easily changed, if good cause is given. The statutes, including a city charter, can, perhaps, be changed, though with much greater difficulty and loss of time. But frequently, as in Chicago, the municipal accountant runs against the fundamental laws of the State—the constitution—which expressly prohibits certain actions, or methods, which are freely used in other States.

We are easily convinced, therefore, that no expectations of identical ledger accounts, *as such,* are practicable in any number of cities. Therefore we must search for "uniformity" elsewhere, and the Municipal League has found it in a method of grouping the accounts of each city according to the functions of the departments, or bureaus, to which the accounts belong. Certain general titles which are applicable to all cities are first taken, viz.: 1, general government; 2, protection of life, health and property; 3, public charity; 4, public works; 5, public industries; 6, public education, recreation and art; 7, miscellaneous; 8, public trust funds; 9, taxation; 10, public indebtedness.

THE WORK BLOCKED OUT

Under each of these are grouped the departments, or sub-departments, of the city in question. For greater clearness and, in order to approximate to the perfect uniformity of detail (a uniformity which would be ideal to the student but which we see is impracticable), each of these "groups" is subdivided into from two to sixteen divisions, viz., in "general government" we find, 1, executive; 2, legislative; 3, law department, etc., etc., each of which is still sufficiently general in its title to apply to all cities (any city's accounts when intelligently examined can be accurately and satisfactorily apportioned under some, or all, of these divisions). For example, under "executive" will be put all city accounts, whatever their titles may be, which pertain to the Mayor's office distinctly. Under "legislative" will be placed all accounts on the city's ledger which pertain to the City Council or other legislative body.

It is, therefore, apparent that no matter if the actual ledger accounts have titles which are entirely at variance in different cities, by considering the function of the department to which the accounts apply, it is a comparatively easy matter to group them under such a rearrangement or system.

AS APPLIED TO NEWTON, MASS

This group will, at first, be done only once a year for the annual report, as, for example, the grouping in actual practice in the city auditor's report of Newton, Mass.

Upon examination of the tabulations on page 136 et. seq. of this pamphlet, there will be noted: First. The groupings of the accounts of the departments as described above, with the receipts of each group upon the left hand page and the expenditures upon the right hand page (opposite each other for easy reference in comparison); and, second. The arrangement in parallel columns of two main divisions of the figures; "a, Ordinary or Maintenance Accounts," and "b, Extraordinary or Capital Accounts."

I must emphasize this distinction between these two sets of accounts. We have endeavored to make the titles clear as well as comprehensive and, therefore, adopted both the titles "ordinary" and "extraordinary," as used in Boston, Providence, and many other cities; and, also, the titles "maintenance" and "capital," which are more definite, and which are used by the Commissioner of Labor, Hon. Carroll D. Wright, in his bulletins upon the "Statistics of Cities," which are published by the Government at Washington.

SHOULD BEGIN WITH THE COMPTROLLER'S REPORT

This distinction is fundamental, and here we shall be obliged to go into theory a little. I quote from one of my previous reports, as follows:

"In order to lay out a system of accounts which shall be harmonious throughout, making each department's accounts fit into its appointed place in the general scheme, it is all important that we begin with the end; *i. e.*, with the final thing to which all the year's work leads up—the comptroller's report. We must lay this out in such a way that it will give a clear, decisive series of summaries of the results of the year; first, in totals; then descending into divisions, or groups of departments, according to their functions; and thence into departments, sub-departments, and so on, down into the details of each account.

"The average citizen, or city official, can then, from such a comptroller's report, obtain an intelligent view of the city's business; first, in gross; next, in divisions; and, finally, follow down any special line which he desires to investigate and reach the individual item, if he wishes to do so.

"In similar fashion, and for the same purposes of clearness, conciseness and intelligibility, as well as comformity to the plan now being adopted by progressive cities, the statement of assets and liabilities (balance sheet) should be given; first, as a summary; next, in divisions; and then in departments and so on into the details.

"The distinctions must be carefully made between 'Capital Accounts,' which are the permanent investments of the city; and 'Maintenance Accounts,' which are the temporary expenses of the city.

"It is evident that, in theory at least, the tax levy should provide all the money for the 'Maintenance Accounts' (temporary tax bonds included), while permanent investments ('Capital Accounts') may be provided from the same source, or from issues of long time bonds, or both, whichever is practical.

"The essential nature of the distinction between these two kinds of expenditure must be completely recognized and provided for in the accounts. Many cities, especially abroad, have based their system of accounts on these lines, and much practical information can be obtained from their reports.

DIFFERENCES BETWEEN MUNICIPAL AND COMMERCIAL BOOKKEEPING

"While the likeness between municipal and commercial bookkeeping must be kept in mind and acted upon in any lay-out for a municipal system so that it will follow the best commercial practice so far as possible, yet the essential differences between municipal and commercial requirements must also be kept in mind and properly allowed for.

"One of these essential differences appears at once when we consider municipal assets, for, in a commercial corporation, the actual state of the assets owned by it are fundamentally important and upon these the borrowing power of the concern is primarily based, while a municipality's borrowing power does not depend in any degree upon its own assets, but upon the valuation of the city, which consists of the total combined property of the individuals who compose the city, which, of course, has nothing to do with the city as a corporation and cannot appear upon its books as an asset. Therefore, there is not the same necessity for persistent scrutiny of the city's 'plant' and 'equipment' accounts, nor for such exact allowances for depreciation, etc., as are considered absolutely necessary in statements of a private corporation's affairs; yet, as has been previously insisted upon, the distinction between 'capital accounts' and 'maintenance accounts' cannot be scrutinized too closely and the failure to do this has been and still is the source of most of the disagreements in deductions which are drawn from financial statements of public industries (water works, electric plants, etc.), as against those drawn from the statements of similar private corporations.

"In public industries the 'capital accounts' are usually neglected, frequently overlooked entirely, and, therefore, no allowances (or no sufficient allowances) are made for interest, sinking funds, and depreciation on the original investment of the city's money in the plant; thus the apparent running expenses of the plant, as set forth in some public reports, are misleading; they show false prosperity which, sooner or later, must disappear and the actual situation will then make itself known and involve considerable discomfort and loss in the city. Therefore, we must give sufficient attention to the 'fixed assets' accounts of the city and so arrange our reports and bookkeeping that the actual costs of the city's real estate, buildings, equipments, etc., etc., will be at all times evident and, so that, the increase and decrease of each of these accounts during the year will be set forth clearly and accurately in the comptroller's report.

BALANCE SHEET

"The vitally important point in the balance sheet is this, namely, that we show clearly the actual 'quick assets' (cash and receivables) of the city distinct and separate from the 'fixed assets' (real estate, buildings, etc.). These 'quick assets' should include (aside from the sinking funds), all cash in office and at banks, all securities, stocks of supplies on hand, accounts receivable, taxes collectible, etc., etc., and against these should be clearly set forth on the other side of the balance sheet (credits) the actual current liabilities of the city; viz., the warrants, unpaid, interest due, temporary loans unpaid, judgments unpaid, etc., etc.

"In this manner the actual condition of the city's finances is disclosed and the average citizen, or official, cannot be easily misled, for it is a fact that while the statement of a large surplus of total assets (including 'fixed') over total liabilities may be true as a bookkeeping matter, yet incorrect deductions are generally drawn from such statement by the average citizen.

THE POINT OF VIEW

"The fundamental importance of systematic accounting is evident when we consider that all practical and successful improvements in city affairs must be premised by thorough knowledge of the actual conditions which are sought to be improved. Unless these actual conditions are fully known it is always difficult, if not impossible, to provide for permanent and efficient reforms.

"Moreover, as municipal accounts and statistics are at the basis of all city affairs, and, as the futility of sporadic attempts at improvement, which have been based upon generalizations from unsystematized and, therefore, misleading municipal statements and reports has been frequently demonstrated in the past, it becomes evident that the necessity for clear, concise, and accurate financial reports of a municipality are the *sine qua non* of municipal progress.

"This being so, it is essential that our first endeavors should be to draw up a complete and satisfactory form for the city comptroller's (or auditor's) annual report which shall comprehend all of the financial statistics of the year arranged in such tabulations that the facts can be easily understood by any reasonably intelligent citizen.

THE AVERAGE CITIZEN'S VIEW

"The average citizen's view is the one we must constantly have in mind, and set forth the facts and figures in our reports, so that with a minimum of study on the citizen's part he will readily and correctly comprehend the present financial standing of his city and the amounts of the actual expenditures and income, taxes, valuations, etc., etc., of the financial year in gross figures and also in detail.

"Not only must the form of the report be clear and easily compared with previous reports, but it should also be arranged so as to be compared readily with reports of other cities of similar size.

"Hitherto such comparisons have been practically impossible, but since the very excellent work recently done by the uniform municipal accounting committee of the National Municipal League and its associated organizations, it is now both possible and practicable to so design the comptroller's report and books, vouchers, warrants, etc., etc., which lead up to it, that correct and comparative figures can be obtained and set forth under schedules made applicable to all cities.

"While taking the intelligent citizen's point of view as the one to be primarily emphasized, we must also bear in mind the fact that, up to the present time, the only real interest in any city's financial reports has been displayed by the city officials immediately concerned and by a few exceptionally well informed citizens, usually professional students of civic affairs; so that, while aiming to awaken interest in the average citizen, we must not sacrifice the points which give these reports their present value to the city officials.

VIEWPOINT OF CITY OFFICIAL AND CITIZEN DIFFER

"The difference in these two points of view, generally speaking, is this, that the citizen looks at the matter as he would any other

business enterprise, viz., 'How much does the city take in and how much does it spend in each department, and how much taxes will I have to pay to make up the difference between income and expenditure?'

"The city official, on the other hand, looks at it from the point of view of appropriations, the fundamental question with him being, is the expenditure within the appropriation duly made for it? And he puts less emphasis upon the necessity, or advantage, to the city of the particular appropriation itself. This distinction, while difficult to define, is, nevertheless, an important one which must not be overlooked.

"We shall conclude, therefore, that both points of view are essential, but that hitherto the official's view has been set forth in most comptroller's reports to the exclusion of the citizen's view."

PUBLIC WORKS AND PUBLIC INDUSTRIES

Returning to the city of Newton report we note that in the titles of the "groups" there is an important distinction between "public works" and "public industries." The former consisting of those departments of the city, such as street work, sidewalks, sewers, etc., which require city expenditures, but which do not provide regular income from sales of products (omitting from consideration at present the repayments of special assessment levies which will be taken up later) while the latter, "public industries," includes those departments which, on the other hand, do provide regular income, such as water works, gas works, electric light plants, docks, ferries, etc.

These departments, while now classified under public works in most city reports, are really independent business, each in itself, and should be treated so in city reports.

Each should have its independent set of accounts, its capital accounts (original cost of plant and additions thereto), its income and expense accounts, and at the end of the year should set forth concisely the actual condition of the finances of the "industry" in a balance sheet, and the results of the year's work in an income and expenditure account.

Thereafter any profits which appear in this statement can be turned over to the city's general funds after proper provisions for interest on construction bonds, for depreciation, and for sinking funds, have been made. Losses must, of course, be made good from the general treasury, or by increase of price of the products of the "industry," or by cutting down its expenses.

In such industry accounts the essential necessity for separating capital from maintenance accounts is so evident that no further emphasis upon it is needed here.

SPECIAL ASSESSMENT AND NEWTON REPORT

It is evident that the city's returns from special assessment levies for construction of new streets, sidewalks and sewers, are entirely different matters from the income of public industries, as above described, and, therefore, there will be no occasion for wrong interpretation of our definition of the term industries, nor an excuse for the inclusion of streets or sewers, etc., under this title.

It is necessary to keep in mind the fact that the uniform schedules in the Newton report are, as they state, merely a summary of the receipts and expenses, for it is evident that these schedules must be supplemented by others before all of the needed facts and figures are set forth in tables, which will fully represent the results of the operations of the city for the year.

In fact, the Newton schedules are only one set out of a series, and this series in its completeness will be formulated in the forthcoming report of the National League's committee, and will be, we hope, most fully and practically exemplified in the final arrangement of the Chicago system.

In conclusion, we may properly ask, What are, in fact, the practical results of uniform accounting so far?

My answer would be as follows:

1st. The very careful and thorough survey of the whole field which has been made by the National League's committee and by the other co-operating committees.

2d. The application to practice in the Newton report, so far as one schedule is concerned.

3d. The application to practice in a forthcoming report of the city of Boston.

4th. The same for the city of Providence, R. I.

5th. The same for the city of Rochester, N. Y.

6th. The important application at Chicago, which will determine, better than all else, what portions of the ideal plans can be reduced to immediate practice and what portions cannot be applied; at least, for the present.

AMONG THE IMPROVEMENT CLUBS

School Garden Work by the Woman's Union of Rochester—Its Beginning—Example Copied by Other Cities—The Work in Massachusetts Cities, in St. Paul and Elsewhere

By Charles Mulford Robinson*

AMONG the pretty and attractive city pseudonyms is that of "the Flower City," which has been popularly given to Rochester, N. Y. It is a recognition not only of the spacious lawns and gardens, for these are had by other cities of like size; but especially of the great nurseries that cover many acres and belt the city with a broad band of flowers and with serried rows of shrubs and little trees. Of late, however, there has come to be a new accuracy in the term "Flower City," for the women of Rochester have become leaders—if they were not exactly the pioneers—in the great work of school yard decoration, of beautifying bare school grounds with lawns and flowers and shrubs; of creating among the pupils an interest that expresses itself broadly in home gardens and window boxes. Thus, incidentally, the city is adorned and beautified.

THE WORK IN ROCHESTER

The work has been done under the auspices of the Woman's Educational and Industrial Union, which has a committee on school grounds. In mid-September there was held in a spacious hall the annual Flower Show of the pupils. It was crowded throughout the day and evening, so that many thousand persons must have visited it, and he would have been a poor observer who saw nothing but the exhibits on the tables. For behind the exhibits there lay a meaning that clearly made the exhibition unique among flower shows. This sweet significance, too broad to put into a phrase, was the fostering of the love of beauty, was instruction in the ways of nature—what is called nature-study, and was the culture of civic spirit.

The Woman's Union, in taking up this work, first enlisted the interest and secured the approval of the park commissioners and school board. Barren and uninteresting school yards were selected and were planted with seeds and shrubs, donated largely by the florists and nurserymen, and prizes were offered for those best kept. As far as possible, all work is done by the children themselves. It may be worth while, as a matter of record, to describe the earliest experiment, from the success of which the movement grew.

EMBELLISHMENT OF SCHOOL YARDS

School number 36 in Rochester was chosen as a sufficiently discouraging and needing field. This was in the early spring of 1900, when the fine new building was surrounded by a large plot chiefly notable for its crop of tomato cans and broken crockery, and for a pond of which the neglected borders even added something of ugliness. Immediately around the school, indeed, the ground had been terraced and smoothed, and the stiff clay, packed by the tramp of little feet and baked by the sun, presented a floor-like appearance that

* Mr. Charles Mulford Robinson, the well-known author of "The Improvement of Towns and Cities," has been added to the staff of the MUNICIPAL JOURNAL AND ENGINEER. As he has given much study and attention to the question of civic improvement, particularly, as now carried on by hundreds of "Civic Clubs" throughout the country, he is well equipped to look after the interests of the "Improvement Clubs." He will contribute two or more pages of matter each month, dealing with the practical side of the question. From this new feature the civic workers in the more than 10,000 incorporated places in the United States will be able to obtain much valuable assistance.

held forth no hope of vegetation. Under the active leadership of the principal, Miss H. N. Kaessman, and the assistance and influence of the Woman's Union, the beginning was made. The hard earth was covered with rich black soil, and grass was planted. Ferns, gathered in the woods by the children, were placed along the shady side of the wall; vines were planted and trained, shrubs were set out, and for a round flower bed in the center of the plot the Woman's Union provided seeds of hardy and swiftly growing plants, such as nasturtiums and sweet peas. The board of education, aroused by the excellent results, gave a wire fence for three sides of the plot, leaving the back open for the playground. But there was no part of the yard for which the children cared so much as that which they were cultivating. Each one had a spade or hoe, and the phrase "our garden," so frequently heard among them, was no misnomer.

RAPID SPREAD OF "IMPROVEMENT FEVER"

From the success attained here the movement spread rapidly. By June of the same year the yards of four schools were under cultivation, and the public interest had resulted in the donation to the union of more than $200 worth of material, by various nurserymen and florists. The union now announced a series of prizes, opening the competition to the pupils of the six schools. There were to be prizes for the best window boxes grown by pupils and for the best potted plants grown from seed, in order that children living in flats and blocks might have a share in a competition that otherwise would have been limited to children who had access to a garden. There were prizes also for the best flowers grown by a boy and for the best grown by a girl, for the best nasturtium, phlox, aster, and petunia; and there were prizes for the schools—a picture to the school that had the best display of flowers and plants; and prizes to the grades that made the best exhibit. All of the prizes were donations. At the end of the summer the exhibition was held and the prizes were awarded.

So widespread now was the interest, both among the children and the public, that there was a demand for the extension of the movement to all schools that had grounds. In many cases the children showed a disposition to take up the work even if unassisted. As a result there is this year hardly a school in Rochester that has not raised a fund and attempted something in this direction, and many of them have been doing the work by themselves. The superintendent of the parks has freely and willingly laid out the grounds and given advice; but the cost of the improvement—such as it may be—has been borne by the school, and the labor of it has been done by the pupils. The good effect of the experiment has appeared also in many home gardens, and the city has thus been made fairer not only by the improvement of isolated plots of school land, but by the embellishment of much private property that had been formerly neglected.

OTHER PLACES FOLLOW ROCHESTER'S EXAMPLE

Meanwhile, too, the fame of the movement has spread far beyond Rochester. Interest extended through educational circles all over the State; Cornell University made the city an "experimental station" because of the work; and though photographs, lacking color, do scant justice to gardens, there came such a demand from conventions and meetings throughout the country for "before" and "after" pictures of the improved school grounds, that the union this year issued an appeal for photographs and made some of the prizes contingent upon the school yard improvement revealed in photographs. The prize competitions of this year were extended also—significant of the growth of the movement—to include the best display of cut flowers grown by public school pupils; the best herbarium of wild flowers; and the best collection of sprays of leaves from native shrubs and trees, each to be made by a pupil. Prizes were also given for the best bouquets of cut flowers raised by pupils, and it is said that the children used 22,600 packages of flower seeds. Thus it is true that the pseudonym "Flower City" has come to have a new meaning, and a greater accuracy, when applied to Rochester.

THE CHILDREN'S FLOWER SHOW

Of the exhibition itself, held in mid-September, there is much that might be said. In the planting of the school grounds, care has been wisely taken to choose mainly those shrubs and flowers that bloom in the spring and autumn, so that the grounds may be at their brightest and loveliest when the children can enjoy them. As a result of this, the display was very brilliant. The huge room was artistically decorated even without the exhibits. Here, for instance, a column of blue asters, uniform in shade, filled a corner. There a hedge of giant scarlet canna caught the eye, and yonder bunches of golden rod were like a band of November sky at sunset. Up and down the room ran the long tables with their bright display; and in the afternoon the aisles, crowded with children—for the schools were dismissed that the children might see their own exhibition—were such another flower garden of hats, bobbing like the dancing waters of a river all flower-strewn. On the tables there was not a little both of the humorous and the pathetic, with over all a fine educational and civic significance. Among the individual exhibits one saw, for example, in a cheap tumbler, a bunch of pansies "garnished," so to speak, with parsley, and so learned of the size and practicalness of somebody's garden. In a sea of beautiful cut flowers there was a bouquet gay with varicolored asters among which tight-closed day lilies raised their heads, while one dissipated moon flower wondered at its strange environment. Near it, from another bunch of asters, an incongruous blue larkspur stretched its long neck like a startled giraffe; while further along, among a lot of pretty vases, a broken peach basket of the smallest size did duty so valiantly that in wonder at the brightness of its burden one forgot its lowliness.

It is common opinion in Rochester that no exhibition of the year is more interesting, touching, and withal more encouraging, than the flower show of the children of the public schools. Certainly there is none that locally represents more fully the woman's civic movement.

Three women have borne the brunt of the effort, and have made the movement the success it is. They are Mrs. Horace B. Hooker, Mrs. W. T. Fonde and Miss Florence Beckwith. The idea was brought to Rochester, or at least so presented that the union acted upon it, by Mrs. William A. Montgomery.

THE WORK IN MASSACHUSETTS' SCHOOLS

It is not to be understood, of course, that Rochester is alone in school gardening. For some years the Massachusetts Horticultural Society has been interested in it, and has even had a committee on the subject. Indeed, it is as much as ten years since the first school garden was established in Massachusetts, its site being the George Putnam School in Roxbury. Four years later there were gardens in two schools in Medford, and finally the State Horticultural Society offered prizes for school garden work and thus gave new impetus to the movement. Last year the chairman of the society's school garden committee went to Germany to study the very advanced school gardens there and he has come home with an exceptionally interesting report. In Minneapolis the Improvement League has recognized the value of such work and has taken action to further it. In Illinois a bill was passed by the last legislature authorizing gardens at all the public schools and making provision of funds therefor. But in Illinois the purpose is agricultural rather than decorative. In Denver recently, under the impulse of the City Improvement Society, five hundred dollars was expended for school ground trees on a single Arbor Day, and that day, appropriately, is more and more availed of for school yard decoration. In New York State, again, the Superintendent of Public Instruction sent out a communication last winter approving of school gardens, and some residents of New York City, where ground is precious, began seriously to question whether gardens might not be put on the school roofs. The movement is one that has been lately winning its way rapidly; but as a product of voluntary effort by women it has nowhere made more advance than in Rochester.

ST. PAUL'S CIVIC LEAGUE

The first annual report of the Woman's Civic League of St. Paul, as submitted by Mrs. Condé Hamlin, the president, is of such interest as to excuse a reference to it even when several months have passed. It has the advantage of offering an example that will be very pertinent and helpful at the season when clubs are beginning their winter work. The league was formed on the 9th of March, 1899, when a company of some 150 women met for the purpose of "forming an

association in the interest of city government." They drew their inspiration from what had been accomplished by the women of other cities; and at the start they were told, doubtless by their lords and masters, that there were "enough societies for discussion; but that, if organizing for work, we could find plenty of it to do." At the end of the league's first year, Mrs. Hamlin was able to report, with very justifiable pride, that it had not yet passed a single resolution which was not designed to precipitate immediate action, and that the paper she was then reading was the first that there had been time to write, and *its* theme was "what we have done."

It will be profitable to note the principles of the league and its form of organization—information which Mrs. Hamlin puts at the end of her paper. "The platform of the league," she says, "is very simple. It is without politics and without party. It has no axes to grind, no selfish ends to gain. It is absolutely impartial and impersonal, and its success will unquestionably be measured by its ability to remain so." The plan of organization is explained to be division by wards, with representation in a unifying body. "This plan implies a general organization, with its officers and governing board, and as many sub-organizations as there are wards in the city. As soon as a ward has sufficient membership to enable it to organize, it is entitled to representation in the executive council of the league. It is intended that a ward will in turn be subdivided into precincts in its organization. It is planned that there shall be an inspector for each school whose duty it shall be to report to the chairman of the educational committee. The purpose of this is, first, that the women living in a ward shall take an enlightened interest in all things which pertain to the ward and work together for its improvement; and, second, that a general organization of the women of the city shall be perfected which may be employed on occasion for the promotion of any public enterprise the league may see fit to support." Before the end of its first year, the league had a more or less complete organization in five wards, and membership in every ward.

That year's achievements of the league may be roughly divided under three general heads: (1) Co-operation with the City Health Department in matters pertaining to cleanliness and public health; (2) Co-operation with the Park Board and City Engineering Department in matters pertaining to the care of the streets, street lawns, the planting of trees, improvement of vacant lots, etc.; (3) Co-operation with the Board of Education in fostering the interests of the public schools. It is important to note that in all the work there was co-operation, not antagonism.

STREET CLEANING BUREAU OF NEW YORK UNDER TAMMANY

By W. F. Morse

In 1898 the street cleaning department of New York City began its work under Tammany administration with an inheritance of a well organized and thoroughly equipped service, with many labor and money saving methods and apparatus in running order, and with well defined plans for continuance of the service successfully organized and carried on by Col. G. E. Waring.

DISINTEGRATION BEGINS WITH TAMMANY CONTROL

With the appointment of a commissioner as a reward of political service, the decay and demoralization of the department began. The impetus given by Waring carried on the department by its own momentum for a short space, but presently the signs of deterioration were evident. The discipline of the working force was relaxed. Appointments for political reasons replaced actual workers, and this in turn resulted in the suppression of the Board of Arbitration, made up from the working force as a kind of court for the redress of the complaints and grievances of the men.

Since the appointment of the present Commissioner, two years ago, more rapid progress in the disintegration of the department has been the order. The apparatus and machinery invented for handling the ashes at the dump was removed and sold for junk; the three steam dumping boats that each took 500 tons of waste to sea, were put out of commission. Contracts were made without competition, by which the ashes were dumped on land in New Jersey at prices double the previous cost, and these were continued by day-to-day agreements in defiance of the law. The waste disposal station, built at a cost of $20,000, which paid the city for the last period of its service $1.10 for each ton of waste handled, was abandoned. The refuse paper and rubbish of the whole borough was turned over to one man, who sorted out and sold what was marketable and deposited the worthless portions on land for the benefit of private parties at a cost to the city of $165 for each scow load. This same contractor was allowed to sell back to the city a part of his pickings, which were given to another contractor for nothing. The crib work at Riker's Island, built for the deposit of ashes, was allowed to go to pieces and the ashes worth 15 cents per cart load for land filling, were given away.

DEMORALIZES GARBAGE SYSTEM

The advertisement of the garbage disposal contract for Manhattan was delayed until there was only one month allowed to build a plant for its disposal—a manifest impossibility. In accordance with the expressed intention of the Commissioner, the contract was awarded to the Sanitary Utilization Company for five years to come, at a cost two and one-half times greater than had previously been done by the same company. The contracts pending for Brooklyn are now delayed beyond a time when it is possible to build a disposal plant before the work begins, January 1, 1901.

The financial side of the matter is a most striking evidence of mismanagement and waste of money. Col. Waring's report for 1895-6-7 shows that his expenditure for the "street cleaning account," excluding "snow removal," was $2,845,000 in 1896, and that the total percentage of increase for these three years of service was 11 per cent. as compared with the three previous years of Tammany control. This included the extraordinary expenses of establishing a reformed service, the many experiments carried out and the apparatus and methods he originated and brought into use.

The expenditures of the department under Tammany administration beginning in 1898, for the boroughs of Manhattan and Bronx, on the "street cleaning account," exclusive of "snow removal," was for 1900, $3,472,236.37. The total percentage of increase for the three years of Tammany rule is 24 per cent,, as compared with the three previous years of reform administration. This 24 per cent. of increase represents the sum of $900,000, which, by the end of this year, will be one and one-quarter millions of dollars appropriated and spent over the amount actually necessary to maintain the department in efficient condition, besides committing the city to the payment of $1,044,000 increase for payment on the Manhattan garbage disposal contract, and a proportionate increase in the Brooklyn contract, which, if awarded on the same conditions as Manhattan, will call for $740,000 more in the coming five years.

RESULTS IN INCREASED DEATH RATE

The most serious matter in connection with the bad administration of the Street Cleaning Department, is the increase in the death rate of the population under Tammany rule.

For thirteen years prior to 1894 the average mortality was 26.78 per thousand. For 1897, after three years' efficient work of the Board of Health and Street Cleaning Department, under the Strong administration, the rate was brought down to 19.63 per thousand. This means 15,000 fewer deaths than there would have been had the average rate of the thirteen previous years prevailed.

The State Board of Health reports, October 1st, that the average death rate in Manhattan and Bronx for July, 1901, was 25.5 per thousand, an increase of nearly 6 per cent., and meaning the loss of 12,000 lives over the previous three years of reform administration.

It is not maintained that this loss of life is altogether due to the inefficient management of the Street Cleaning Department, but it is undoubtedly true that this department is responsible more than any other for the unsanitary conditions which have existed, and in consequence of which the mortality has so largely increased.

These are the practical results of an administration of a great department of New York City for the benefit of Tammany politicians "working for their own pocket all the time."

INTERESTING STATISTICS ABOUT DRESDEN

DRESDEN is an example of what can be accomplished in public finance in public works in a well administered city of 400,000 people. Its annual income for 1900 was $6,612,229; expenditures, $6,274,227; balance on hand, $338,002 to be deducted from next annual budget. This is the more interesting when we note that all branches of public works, such as water, gas, and electric power and light, street paving, etc., were kept in good condition, and several important additions to the water works paid for.

PENSIONING OF CITY EMPLOYEES

Dresden pensions all deserving municipal employees, their unmarried widows and minor children, at a cost of about $76,000 per year. This includes all, from the highest class to common laborer, in all departments, such as finance, tax, water, police, lighting, fire, health, school, charities, hospital, insane asylum, orphan asylum, municipal, savings bank, and other departments.

Pensions are granted to those—(1) Who have served at least ten years, who have become invalids because of service to the city; (2) who have been good and faithful employees; (3) who have need of a pension; (4) who are recipients of the German national old age or invalid pension; (5) no one has a legal right to claim a pension; (6) exceptions to the first and fourth conditions can be made by vote of the city Council or Aldermen.

SOURCES OF INCOME

The sources of income of the city are many, besides taxes. They are from large funds invested in national, State, and other bonds; from its gas, electric light and power works, water works; large and many endowment funds for schools, charities, and quasi-public improvements. It also levies direct and indirect taxes upon the people of the city in a way which does not fall too heavily on the real estate. The following analysis is instructive when compared with the systems of American cities:

DRESDEN DIRECT TAX TABLE

Source.	Total receipts.	Per cent. of total income.
Poll and residence tax	$ 70,000	2.61
Income tax	1,500,000	55.10
Real estate	205,000	7.65
Real estate transfers	370,000	13.71
Certificates	200	.01
Hunting permits	600	.02
Fishing permits	15	.00
Dancing pavilions, etc	15,000	.55
Theatre licenses	12,100	.45
Camping permits	150	.01
Dog tax	25,400	.85
Flour, meal and products (1)	175,000	6.52
Beer (2)	103,000	3.86
Fish (3)	15,000	.55
Venison, etc., (4)	15,000	.60
Game, birds, etc., (5)	11,000	.41
Prepared meats (6)	31,400	1.21
Cattle, etc., for food (7)	160,400	5.87
Total	$2,682,413	100.00

The tax on the seven food products aggregates $510,588.

CIVIL SERVICE IN VOGUE

The employees of all grades are chosen after general civil service examinations and special examinations according to the positions to be filled. They are examined for promotion in addition to the value of their record. They serve during life, efficiency and good conduct, until retired for inability from old age or sickness, when they are pensioned as stated. The total city pay roll is about $826,000 per year.

EXCELLENT FIRE AND POLICE DEPARTMENTS

The fire department is excellent, but small because almost all the buildings are fire-proof. This department consists of one chief, two division chiefs, one secretary, twenty-two captains, one hundred and forty-four firemen, twelve assistant firemen, aggregating one hundred and eighty-two men for nearly 400,000 inhabitants.

The total fires last year were 717, of which 669 were put out by hand, without engines; forty-two needed two or less streams of water, six needed two or more streams. The largest fire lasted three hours. The steam fire engines were needed only three times.

The total loss, fully insured, was $37,490. The cost of the fire department for the year was $90,352.

The police department contains about 224 men and cost for the year $110,940.

PUBLIC SCHOOLS

The public and all city schools using public funds cost $1,141,000, which indicates that much more, in proportion, is given to education; hence, less is required for police, fire and other branches of city affairs than in cities where there is lack of method, education and experience in public affairs on the part of public officials and employees. Here the adage is well illustrated, "What you wish in a nation put in at the schools."

CONSTRUCTION AND COST OF STREETS

The pavements of Dresden are as follows:

Kind.	Total, in sq. yds.	Amt. of annual repairs, sq. yds.	Per cent. of total amt.
Stone blocks	1,335,040	33,600	2.5
Asphalt	120,000	2,669	2.1
Macadam	2,207,600	161,280	7.1
Totals	3,662,640	197,549	5.4

The macadam was maintained by the block system and required forty-six men at all times for general maintenance besides the 161,280 square yards, which were resurfaced with crushed stone.

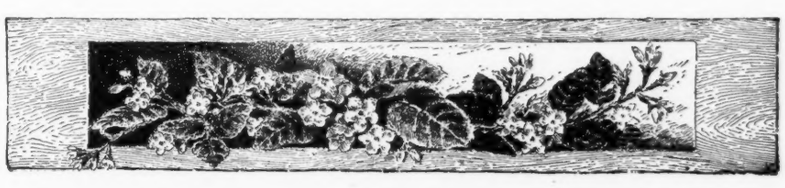
The street cleaning department cleaned roadways and sidewalks as follows:

Stone blocks	2,261,000 square yards
Asphalt	339,472 square yards
Macadam walks, etc	465,136
Total	3,065,608 square yards

Of the above the men cleaned 1,612,800 square yards more than once each day.

The annual cost of street cleaning was as follows:

Kind of work.	Total.	Cents per sq. yd.
Streets and sidewalks	$157,200	5.232
Snow removal	40,000	1.340
Sprinkling	39,200	1.232
Totals	$236,400	7.804



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NEW YORK, NOVEMBER, 1901

THE city of Spokane, Wash., has paid in recent years thousands of dollars for damage suits resulting in injuries received on defective sidewalks. The city authorities seem to have been rather lax in enforcing the ordinances requiring the construction and maintenance of proper sidewalks. It is cheaper to maintain safe walks than to pay damage suits.

THE appalling death rate which is to be charged to the account of the various street railway systems of the country would be largely reduced if every car, particularly the large double trucks cars, should be equipped with a modern air brake. This device is already in use on thousands of cars, and has demonstrated its ability to prevent accidents in innumerable instances.

THE citizens of Boston have organized a new society, to be known as the "Public Franchise League." Its purpose is to see that franchises for the use of public streets are not given to corporations for nothing, but that the interests of the public are protected by the restriction of the terms of franchises and by payment to the public treasury. The friends of better civic government cannot be too earnest in this direction.

COLUMBIA, S. C., has been following the example of several California cities by sprinkling certain of its streets with oil. It has been found by actual practice that it costs about thirty-six dollars per block, and that it not only settles the dust, but makes a better road. With the improved oil sprinklers that are now on the market there is no reason why every city should not employ this means for bettering the conditions of its dusty unpaved streets.

THE fenderless car and the car equipped with the home-made fender continue to get in their deadly work. A boy nine years old was decapitated by a street car, which was equipped with a home-made fender, in Brooklyn the other day. The same day, in Jersey City, a six-year-old boy was decapitated by a fenderless car. Sometimes city officials are powerless to correct these evils owing to defective charters. When such is not the case, however, the mayor and council should use all diligence in the passage of an ordinance compelling the use, on all street cars within the city limits, of a well-made fender.

CLEVELAND has been classed as one of the three smokiest cities in the United States. The Board of Smoke Inspection was established a couple of years ago, and the assistance of state and local regulations was brought into requisition to enforce the use of the down-draft furnace and under-feed stoker and other smoke preventative appliances. As a result it will be possible to add Cleveland, in the near future, to the list of smokeless cities, an achievement which would have been deemed impossible three years ago.

THE problem of getting rid of the wires above ground is not without its serious difficulties, as Baltimore and other cities have already discovered, but it is a problem which should be solved with all possible speed for the good of the public. There are well known methods which can be employed for burying all wires which would reduce the danger to a minimum. The safety of the general public demands that these wires shall be placed in properly constructed conduits. City administrations should be as expeditious as is consistent with good judgment in putting these wires under ground where they belong.

The Times, of Trenton, N. J., is agitating the question of better paved streets for that city. It says editorially: "Those who read municipal journals know that rival asphalt companies have made trouble in almost every city in the country. Charges of corrupt practices of many sorts have been brought against the asphalt companies." If honest competition cannot be secured in any city, it is as likely to be due to corrupt officials as to corrupt corporations. If every city would place the letting of its contracts in the hands of a board of contract and supply, the personnel of which was made up of five business men in the community whose integrity was unquestioned, there would be fewer charges of this kind and our cities would profit by the change.

FOREIGN cities use from one-half to two-thirds less water per capita than American cities. The enormous waste of water which is permitted on this side of the Atlantic simply astounds our friends on the other side. It could largely be prevented by the installation of water meters upon every service tap. It has been demonstrated repeatedly, that the water meter not only benefits the consumer, but the city. The erroneous impression prevails in some quarters that large expenditures are necessary for the maintenance of meters, whereas the contrary has been demonstrated in actual practice. The cost in Harrisburg, Pa., for the inspection and care of the water meters in service is only about one per cent. of the amount invested. It is putting it mildly to say that every water works department should be fully equipped with water meters.

BEGINNING with this issue, the MUNICIPAL JOURNAL AND ENGINEER will devote considerable space each month to a record of the work which Improvements Clubs are doing for the betterment of cities and towns. To this end we have added to our staff Mr. Charles Mulford Robinson, one of the best known authorities in the United States on civic improvement work. It is our intention to have Mr. Robinson survey the whole field of club activity, not only in this country, but in Europe. He will chronicle in brief notes the achievements of various clubs, using such matter as shall stimulate and help others to obtain greater results. Following our policy in the treatment of other subjects, illustrations will be freely used in this department. We solicit the earnest coöperation of all our readers who may be connected with civic clubs to assist in efficiently carrying out this broad project. We shall be pleased to receive annual reports, newspaper clippings, club invitations, club papers and club literature of every variety.

THE Supreme Court of Illinois has recently rendered a decision affecting the taxation of every corporation in that state. It especially provides that the franchises and capital stock of these corporations must be taxed on their market value. The court rules that for sustaining the basis for assessing franchises with capital stock, especially of public service corporations, the market value of the capital stock and of outstanding bonds shall be added together on April 1st of each year. After deducting from this aggregate the assessment

already laid on tangible property of such corporations, the remainder must be assessed alike on other property. This decision will add to the annual tax income of Chicago and Cook County alone about fifteen millions of dollars annually. There is no good reason why the corporations, particularly the franchise corporations, should not bear their share of the tax burden. In most cities it is a notorious fact that they do not. This decision is a decided victory for the tax reformers of Illinois.

THE Springfield *Republican* has brought to an end a series of sixteen articles having the common caption, "Let Us Make a Beautiful City." In this series of articles the writer has undertaken to show practically how Springfield might be transformed into a beautiful city as compared with other American cities. It is already beautiful, but there are abundant opportunities for adding to its beauty, which are pointed out in this series of well prepared articles. *The Republican* is not alone in its efforts to beautify its own city, for there are scores of other daily newspapers engaged in the same work, but it is well to call attention to its effort as one of the hopeful signs of the times. The principles which are set forth as being essential to the achievement of the desired end are these: first, that all money be spent wisely with due regard for looks; second, that all æsthetic matters, architecture, landscape, gardening, &c., be in the hands of men who know; third, that private citizens do their best individually; fourth, that they help to obtain coöperative effort; fifth, that there be a clearly defined and generally accepted plan looking far forward into the future to be carried out as opportunity permits. There is no more potent agency at work for the betterment of cities nowadays than the daily press, and if all used the discriminating judgment shown in this series of articles, which has just been republished in pamphlet form by *The Republican,* it would not be many years before American cities would be numbered among the most beautiful in the world.

THE MODEL CITY AT THE ST. LOUIS FAIR

THE managers of the St. Louis World's Fair have decided to have a municipal exhibit as one of its prominent features. They propose to teach a much needed lesson in modern city building. Since the idea was first presented to the public several months ago, it has been widely discussed in the press of the country, and always with the most hearty approval.

That this would be a drawing card is clearly shown in an editorial of *The Republican,* Springfield, Mass., which said in part: "No better advertisement of the St. Louis Exposition could be desired than the knowledge that the latest thought and the best achievements in the departments and functions of a city could be studied there, after the above plan. More and more is the ambition spreading to make our cities beautiful, and to provide for the people the best service in all those things which an up-to-date municipality undertakes to do. Those who have the best show can well afford to submit their products to the exposition authorities, and when official indorsement has been secured, instal them without cost. Such a municipal art exhibit should be wisely and impartially governed, and, this attended to, the result would be well worth having, and so would St. Louis surpass all previous expositions."

In speaking of the importance of this proposed municipal exhibit the Kansas City *Star* recently said, editorially: "By no other means could a great number of people be given that most convincing evidence—occular demonstration—of the desirability of improving the fitness of American cities as places of residence than by showing the millions of visitors at the exhibition the possibilities in this respect.

"It would not impose an additional cost upon the exposition management. The idea of building the city beautiful might be incorporated in all of the plans made by the exposition people. The great buildings devoted to the classified exhibits need only be embraced in the plan so far as adding to the beauty of the scheme goes. But for the rest a model city might be made of those necessary adjuncts to the exposition, administration buildings and various offices, which must be erected in any event. The plan for the city may properly be left to the Municipal Art Society, which put forth the proposition.

"In the great strides made in the art of city buildings in the past twenty-five years in this country, the beautiful has generally been sacrificed to the utilization or the commercial. We have not kept sight of the fact that while a city is building it might as well be made a beautiful and healthy place as simply a place to live in. Our natural disposition to let each man build according to his ideas or his lights has had the effect of producing on this continent some of the most barbarously hideous and expensively built cities in the world. Every property owner has apparently ignored the fact that he was not alone on the earth. He has not considered his surroundings or his neighbors'. He has been intent upon putting up business blocks as high as his bank account and the laws of gravitation would permit. If he built a residence for himself he might possibly think of the surroundings; if he built one for somebody else the only object he had in sight was to put up a house that would bring in a maximum of rent on a minimum of investment. Except in isolated localities, where men of taste have united for the purpose of making their homes beautiful as well as luxurious, this country is as unlovely as an adobe village.

"A model city, adjusted to model conditions of government, exhibited at the fair in 1903, would be the most interesting and instructive of the features of the fair. And it would pay Kansas City to send a few thousand of its obstructionists and kickers down to St. Louis to board at the model boarding house for a season."

The wisdom of having such an exhibit is unquestioned. And no one seems to realize it more than the World's Fair managers. It will be the first exhibition of its kind ever made in connection with a world's fair.

The citizens of St. Louis also appreciate that their city will, in one sense, be on exhibition, and for that reason are now talking about the "New St. Louis."

It is proposed to expend not less than four millions of dollars upon the city itself. The plans involved include the laying of many miles of pavement and extensive improvements in the sanitation of the city, all of which will be completed prior to May 1, 1903. Mayor Wells is aiding the movement by bringing to its assistance the machinery of the entire city administration. In furthering this project he has established what may be called a municipal cabinet, the following officials being included: The City Comptroller, City Counsellor, President of the City Council, Speaker of the House of Delegates, President of the Board of Public Improvements, Street Commissioner, Sewer Commissioner, Water Commissioner, Park Commissioner, Harbor and Wharf Commissioner, Commissioner of Public Buildings, Health Commissioner and Surveyor of City Lighting. Upon every one of these officials will fall a large share of the responsibility for the rehabilitation of the "New St. Louis," under the improved conditions carried by the recent adoption of the charter amendments. Apparently Mayor Wells realizes the magnitude of the task that is placed upon his administration. The vigorous manner in which he has taken hold of the question augers well for its successful consummation. It is safe to predict that when the gates of the World's Fair shall be opened in St. Louis in 1903 all preparations which devolve upon the city will have been adequately made. This achievement together with the municipal exhibit within the gates of the Fair will not fail to attract world-wide attention.

RETURNS FROM FRANCHISES IN WOONSOCKET

WOONSOCKET, R. I., October 9, 1901.

Editor MUNICIPAL JOURNAL AND ENGINEER:

REPLYING to the inquiry about franchises in Woonsocket, I would say that the street railways now have an exclusive twenty-year franchise in this city and are to repair the pavement between the rails and eighteen inches outside of same. They pay to the city 3 per cent. of their gross receipts.

The gas is supplied by a company that put down its mains years ago, and now can extend them with the consent of the Board of Aldermen or town council.

As to the water works, the city now owns its own plant.

The telephone companies obtain permission from the aldermen from time to time to put up their lines upon various conditions. One condition imposed is to allow the fire department to string wires for the fire alarm upon the poles. EDWIN J. FRANCE, *City Solicitor.*

AN EXCELLENT INDEX SYSTEM

SPOKANE, Wash., September 13, 1901.

Editor MUNICIPAL JOURNAL AND ENGINEER:

OUR method of filing papers keeping records, etc., it is almost impossible, in a limited communication, to explain, though it is simple enough when one can observe it personally.

We do not file any county papers in the city clerk's office, the city and county offices being entirely separate. About the only papers filed in the clerk's office here are papers that are to be presented to the city council, of which there are all sorts of petitions and communications on all sorts of subjects.

For our journal, we use a Graves index, enlarged and changed to suit our purpose. Every paper filed is jacketed and numbered, and when we check up the journal, the number of every paper referred to is written on the margin of the journal opposite the paragraph referring to the paper. There are 200 of these papers in each box in the filing case, and they are numbered on the outside of the case, thus: "8000 to 8200, 8200 to 8400," etc.

Let me illustrate how the filing is done. A petition to grade Post street, from Brown to Smith street, is filed. It is indexed under "Post street grade," the journal page and filing number being given, and every time the matter comes up again in any way the journal page is again entered. If I wish to look it up I turn to Post street, take the journal pages and filing number (the filing number on the journal margin catching my eye first on every page referred to), and in this way I can follow the paper through every action taken on it until it is disposed of, and if I want the paper or petition itself, even twenty years hence, I can step to the filing case and get it. Of course I "cross" index. I use a journal of 800 pages, each journal having an index of its own, on the back of which is printed, "Index to Journal A," "Index to Journal B," etc., and on the back of the journal, "Journal B, from January 20, 1899, to August 16, 1901," etc.

Ordinances are jacketed and filed in the same manner, and in addition are copied in an ordinance book, which has an index under the same cover.

For filing bonds, we have a bond filing record, which gives the name, amount of bond, when filed, when approved, etc., the bonds being numbered consecutively. L. F. BOYD, *City Clerk.*

PERSONALITIES

—C. A. Hague, C. E., has been appointed engineer of the proposed new water works to be built at Grand Rapids, Mich.

—Mr. John E. Owens has been appointed city attorney of Chicago, Ill., by the mayor, to succeed Andrew J. Ryan, resigned.

—The R. H. Tingley Co., consulting engineers, have removed their officer from 102 Fulton street to 32 Broadway, New York City.

—Carroll D. Wright, United States Commissioner of Labor, has been elected a member of the International Institute of Sociology.

—A lone robber last month had the temerity to hold up Mayor H. S Rowe, of Portland, Ore., and relieved His Honor of a gold watch and his pocket-book.

—Mayor Capdeville, of New Orleans, La., has received the insignia and decoration of the Order of St. Olaf, conferred upon him by King Oscar of Sweden.

—Charles A. Miller has been re-elected city clerk of the city of Harrisburg, Pa., by the unanimous vote of a joint convention of Select and Common Councils.

—Hon. W. M. Drennen, Mayor of Birmingham, Ala., is greatly interested in the good roads train that the Southern Railroad will send through the South.

—Professor Edward W. Bemis, who was invited to Cleveland, O., to give the Mayor his advice on tax questions, has been appointed superintendent of water works of that city.

—Howard P. Foster, Chief of Police of Albany, N. Y., has recently resigned his position, and much excitement was occasioned in political circles, as it was rumored that the mayor had a hand in it.

—August Belmont, president of the New York Rapid Transit Subway Construction Company, is now in Europe inspecting the subways there. He is accompanied by John B. McDonald and others interested in the work.

—Major John B. Harlow has resigned as a member of the Civil Service Commission and will return to his former position in the St. Louis post office. William Dudley Foulke will succeed him in his recent position.

—Mrs. Charles C. G. Thornton and her daughter, Miss Mary C. Thornton, of Magnolia, Mass., have given $20,000 for a library building to the Thornton Academy, Saco, Me., as a memorial to the late Col. C. C. G. Thornton.

—The city of Portland, Me., has been presented with $20,000 to be used for the erection of a handsome chapel in Evergreen Cemetery. The donor is Mrs. Mary E. Wilde, of New Jersey, whose husband is buried in that cemetery.

—Charles A. Bookwalter has been elected mayor of Indianapolis on the Republican ticket. Charles N. Elliott was elected city clerk on the same ticket. It is the first time in six years that the republican party has been successful in the city.

—Mr. W. F. Morse, sanitary engineer, of New York City, has just gotten out a pamphlet entitled "The Street Cleaning Department of New York City Under Tammany Administration," being reprinted articles from the New York "Vigilant."

—Mayor Carter H. Harrison, of Chicago, Ill., has declared that he will not again be a candidate for mayor unless the papers continue to bother him, in event of which he will "go into the field again and show them that he can do the trick once more."

—Prof. Olin H. Landreth, of the School of Engineering, Union College, Schenectady, N. Y., and consulting engineer of the New York State Department of Health, presented a paper on "Sewage Disposal for Cities and Villages" at the recent conference of sanitary officers at the capitol, Albany, N. Y.

—The Hon. Samuel M. Jones, Mayor of Toledo, O., recently tried to save a second-hand clothes dealer from arrest and fine. The dealer was doing business without a license, but when arrested showed a permit from the mayor authorizing him to do business. The Court refused to accept this, however, and fined the dealer $5.

—Hon. Tom L. Johnson, Mayor of Cleveland, O., in an address before the Case School of Applied Science, said that the professors in the great American universities did not dare to teach the truth about taxation, and cited the case of Prof. Bemis, who, he said, was forced to leave Chicago University because of his views on political economy.

—Richard W. Sherman, Mayor of Utica, N. Y., last month vetoed a bill of a certain contractor for cleaning the streets. The mayor says that the provisions of the contract are not being lived up to and that it would be impossible for the number of men employed to do the work as it should be done.

—Mayor Depinet, of Erie, Pa., has been sharply criticized for his plan to send tramps to the jail this winter. It is reported that the Erie jail is too comfortable a place for the "hobos" and that, knowing this, they all try to be sent up for a month at a time to enjoy there "all the comforts of home."

—Mr. John Quincy Adams, Ph. D., has announced that he will deliver a series of lectures on the relations of art to the following reforms: Labor, social, educational, political, moral and reform in the use of things. Those desiring to learn further particulars may address the lecturer at the University of Pennsylvania, Philadelphia, Pa.

—The Right Worshipful, the Mayor of Winchester, England, Councillor Alfred Bowker, has paid this country a visit to take part in the services in commemoration of the thousandth anniversary of the death of King Alfred the Great, which were held in New York City, beginning October 27. Mayor Bowker represented the English National Committee.

—Mr. Herbert B. Ames, a prominent alderman in Montreal, Canada, is much interested in the correct solution of the question of the best method to pursue in laying underground conduits. It is a question whether it is best for the city to lay the subways or allow one of the electrical companies to do so and then have them permit the other companies to use them.

—Mayor Carnahan, of Rochester, N. Y., has vetoed the ordinance passed by the aldermen of the city proposing to buy from the gas company their underground conduits. While the mayor is in favor of the city acquiring the conduits, he is unwilling that more money should be spent for them than is necessary and states that a thorough investigation should have been made by the aldermen before determining the price to be paid.

—The following officers were elected at the thirty-fifth annual convention of the American Institute of Architects in Buffalo, N. Y.: President, Charles McKim, of New York; first vice-president, Frank Miles Day, of Philadelphia; second vice-president, Alfred Stone, of Providence; directors for three years, Walter Cook, of New York; W. S. Eames, of St. Louis, and Cass Gilbert, of St. Paul; auditor for two years, William G. Preston, of Boston.

—Mrs. T. B. Blackstone, widow of the late president of the Chicago & Alton Railroad, has presented the city of Chicago with a library building as a memorial to Mr. Blackstone. Though it will be a branch of the main public library, the building will have a complete equipment of its own, and will contain reference rooms, circulating department, and periodical racks. It will be known as the "T. B. Blackstone Memorial Branch Library," and will cost $100,000.

—Mayor Mims, of Atlanta, Ga., has announced that those members of departments in the city that exceed their appropriations this year will be required by him to pay the deficits for the city out of their personal funds. The mayor is determined that there shall be no deficit and proposes to use three methods of preventing it. He will keep in touch with the city comptroller as to the warrants that are signed; he will weekly impress on the heads of departments the importance of economy; and thirdly, will make those who exceed their appropriations, pay the difference out of their own pockets.

ODD THINGS RELATING TO MUNICIPALITIES

Cities Without Crime—The Wail of the Boston Organ Grinder—Municipal Monument to a Pig—Proposed Civic Milk Supply—The Turk's Way to Prevent Fires

THE WAIL OF THE BOSTON ORGAN GRINDER

DETERMINED that everything in the city shall reach a state of perfection such as is worthy of the "Hub" city only, the authorities of Boston, Mass., have decreed that only such organs as are in perfect tune shall be allowed to play on the streets. The citizens of the most cultured city on earth must not be disturbed in their discussions of Aristotle by harsh or discordant sounds. How this order affects the other side of the question may be seen from the following jingle designated "The Wail of the Boston Organ Grinder:"

I turn ze crank,
  I stop so soon—
Ze man he say,
  "You're out of tune,"
He say to me,
  "You can't play here;
Your horrid noise
  Will spoil ze ear."
My monk' he look
  And drop hees jaw;
I say to heem,
  "Eet ees ze law."
What can I do
  To 'scape ze morgue?
I buy a file
  An' tune ze org',
An' zen I play
  An' pass ze hat;
Ze man he say,
  "You too mooch flat."
Nex' time I play
  I play ze harp,
Ze man he say,
  "You mooch too sharp."
We soon go West,
  Ze monk' an' me;
Zis Boston law
  Too much n. g.

UNIQUE ADVERTISING.—In the city of Leipsic, Germany, a new method of street car advertising has been started. In each car are hung copies of a bi-weekly paper, which contains advertisements, time-tables, notices of performances, etc., and the papers are fastened on racks so that passengers can take them down to read.

THE NEWEST TOWN.—"Soonerville" is the name of the newest town on record. It is located sixteen miles north of Rice Lake, Wis., and the townsite company owns 40,000 acres of land. No one was allowed to locate until October 15, but the president of the town was elected before-hand, and police appointed, who now rule the place with an iron hand.

MUNICIPAL FIRE INSURANCE is soon to be tried in the city of Okalona, Miss. Because of the high rates of insurance, the permission of the legislature has been sought to start this scheme. Its advocates claim that double the amount of insurance could be carried by an expenditure equal to that now required and a sufficient profit still remain to pay the city for its trouble.

HEALTHIEST TOWN IN UNITED STATES.—Reports received by the Marine Hospital Service would tend to show that, of the 1,190 cities and towns of 1,000 from which reports were sent in, Marion, Ia., is the most healthful place. Its population is 4,100, and, as there were only six deaths in 1900, the death rate per 1,000 was only 1.46, which is phenomenally low. The average rate in the United States was 17.47.

ARRESTED TOWN OFFICIALS.—On account of the amount of lawlessness that has been rife in the town of Salem, Pa., the Sheriff of the county sent a deputy to arrest the "speak easy" saloon keepers. The police of Salem arrested the deputy, then the sheriff and deputies went to Salem and smashed the saloons. The citizens protested, the officials took their part, and the sheriff arrested the mayor and the police and put them in jail at Clarksburg, the county seat.

MUNICIPAL COAL YARDS.—Mayor Morris, of Ottawa, Canada, proposes to get even with the local coal dealers who have made a combination on the price of coal and shoved the price up a dollar higher than it can be obtained in neighboring cities, by establishing a municipal coal yard. He maintains that he can purchase coal cheaper than the dealers and that he can sell it at a lower price than they, and he expects to protect the poor families of the city in this way.

TWO SCHEDULES OF CITY TIME.—The city of Youngstown, O., is occupying the unique position of being the only city in the State of Ohio that is not run on standard time. The city solons have not yet complied with the law of the State relative to this matter. Both the standard and local times are used in the city offices, and by city employees and great efforts have been made to get the Council to abolish the local schedule and adopt that prescribed by the State, but without avail.

RAILROAD CAR A HOSPITAL.—When a train on the Erie Railroad reached the city of Meadville, O., one day last month, one of the children of an immigrant in the train was discovered to have diphtheria. The health officers of the city discovered the case on the outskirts, but allowed the train to enter the city. All the other immigrants in the car, excepting the family of the sick child, were transferred to another train and the quarantined car, with its inmates, was placed on a side track, where it could be guarded until the little patient recovered.

HOT LUNCH FOR SCHOLARS.—In the high school in Sioux City, Ia., the school board has undertaken what is proving to be a very successful experiment in serving hot lunch to the pupils at cheap prices. A lunch room has been fitted up, and there the scholars can purchase many hot dishes at minimum rates. Everything is sold for checks, which can be obtained in lots of ten and twenty-five cents worth. Much time is saved in this way, and it is possible to serve ninety boys and girls in ten minutes. A woman runs it for the board, and is allowed to make a little out of it. Everything is clean and the food of the best.

MUNICIPAL MONUMENT TO A PIG.—What is probably the strangest monument in the world is that which has been erected at the Hotel de Ville by the inhabitants of Luneburg, in Hanover, in honor of a pig. This memorial has taken the form of a sort of mausoleum and contains a large glass case in which is hermetically sealed a fine ham cut from the animal whose memory was to be perpetuated. Above the case, cut in a fine slab of black marble was the following inscription in Latin: "Passers-by contemplate here the mortal remains of the pig which acquired for itself imperishable glory by the discovery of the salt springs of Luneburg."

MUNICIPALIZATION OF THE MILK SUPPLY.—The villagers of Farsley, England, have petitioned the district council to convene a public meeting to consider the municipalization of the milk supply, because of the high charges of the local tradesmen. As the request was signed by but twelve gentlemen, and as the council's by-laws require that two dozen signatures be attached, no action has been taken. The clerk of the council stated that a special act of Parliament would be necessary before the Health Department could go into the milk business. It was proposed that the council purchase a cow a piece for each of the twelve signers.

THE TURK'S WAY TO PREVENT FIRES.—Primitive in his opinion of everything modern or progressive, the unspeakable Turk has a hazy idea of even the origin of a fire, to say nothing of the most effective means to staying its progress when once under way. Of late, there have been many serious fires in Constantinople, and the Sultan, having taken cognizance of the fact, issued instructions to the police that they must see that the number of fires is materially reduced. After due deliberation and many conferences, the officials for the police department concluded that the principal cause of fires was insurance, and that in order to remove the danger insurance must be stopped. To carry out this decision, police officers make a house to house visit in the poorer quarters of the city and inform the luckless householder that, unless he brings the next day a letter from the company showing that he has had his policy canceled, he will be imprisoned. Under the circumstances, many of the poor people annul their insurance. As an alternative to cancellation, the police agree to accept a guarantee of several thousands that no fire shall break out in the house in question, or any of the six adjoining ones.

CITIES WITHOUT CRIME.—There is a land that has no prisons, cities that have no police forces. In fact there is no need for either of these usually necessary branches of city and county governments. This strange state of affairs is to be found in the Island of Iceland. The people are so honest that there has never been necessity for installing these things. Of course there is provision for the administration of justice, which consists, first, in sheriffs' courts; second, by appeals to the three judges at Reykjavik, the capital of the island; and third, in all criminal and most civic cases, to the Supreme Court at Copenhagen, Denmark, the kingdom of which the island is a part. Within the last thousand years the records of the island contain but two cases of theft. Of these two cases, one was that of a native who was detected after stealing several sheep, but as he had done so to support his family, who were suffering for the want of food, the stigma attached to the crime was considered sufficient punishment. The other case was that of sheep stealing also. The culprit was a German, who was in comfortable circumstances, and the robbery was malicious. The sentence upon him was that he should sell his property, restore the value of that which he stole and leave the country or be executed. He left the country.

CONVENTION DATES

NOVEMBER

Automobile Show, New York City, N. Y., November 2-9.

Librarians' State Convention will be held at Adrian, Mich., November 8-9.

Southern Educational Association, Rochester, Minn., November 8-9. A. M. Locker, Wabasha, Minn.

National Prison Association, Kansas City, Mo., November 9-13. Rev. J. L. Milligan, Allegheny, Pa.

Prison Wardens' Association, Kansas City, Mo., November 11. N. F. Boucher, Bismarck, N. D.

National Prison Association will meet at Kansas City, Mo., November 11. Rev. J. L. Milligan, Allegheny, Pa.

Charities and Corrections State Conference will be held at Columbia, Mo., November 18-19. C. A. Ellwood, Columbia, Mo.

State Conference Charities and Corrections, Owatonna, Minn., November 19-21. Miss Grace Johnson, Red Wing, Minn.

National Reform Association will meet at Pittsburg, Pa., November 19-21. Rev. T. P. Stevenson, 216 Parkway, Allegheny, Pa.

Canadian Prisoners' Aid Association will meet in November at Toronto, Canada. Dr. A. M. Rosebrugh, 12 Richmond street, East, Toronto.

State League of Municipalities, Colorado Springs, Col., November.

Mayor and Councilmen State Convention, Jacksonville, Fla., November. J. W. Whitet, Jacksonville, Fla.

State Good Roads Association will convene at Jacksonville, Fla., in November. J. W. White, Jacksonville, Fla.

Charities and Corrections State Conference, Baltimore, Md., in November. Louis F. Zinkham, Bay View Asylum, Baltimore, Md.

DECEMBER

Charities and Corrections State Conference, Ionia, Mich., December 10-12. Hon. C. A. Goner, Lansing, Mich.

American Economic Association will meet in Washington, D. C., December 26-28. Chas. H. Hull, Ph. D., Cornell University, Ithaca, N. Y.

FEBRUARY

Sixteenth Annual Convention of the National Brick Manufacturers' Association will assemble at Cleveland, O., February 10-15, 1902.

CURRENT NEWS AND PRACTICE AMONG THE CITIES

Cheap Telephones—Children's Library Work—Columbia Lays Its Dust With Oil—Street Lighting in New England Towns and Cities—Hints for Park Superintendents—London Crematories

CLOCKS IN STREET CARS.—An ordinance has been passed in the city of St. Louis, Mo., whereby the street car companies must place clocks in their cars.

NO SUNDAY DRINKS.—The Mayor of Atlantic City, N. J., has announced that in the future all bars must be closed on Sunday. Nor will side doors be allowed to be open.

PUBLIC BATH FOR ALBANY.—The new public bath in Albany, N. Y., has been completed, and the cost to the city has amounted to about $10,900, including the architects' fees.

THE MUNICIPAL TELEPHONE system has just been put in operation in the city of Glasgow, Scotland. The system will comprise 20,000 subscribers, and there will be underground 16,000 miles of wires.

LICENSES TO SELL BUTTER and eggs must be obtained by the proprietors of out-of-town stores before they can peddle these commodities from house to house in the town of Geneva, N. Y. Ten dollars is the fee charged.

UNIVERSAL TRANSFERS.—In Salt Lake City, Utah, universal transfers went into effect on October 15 on the lines of the consolidated car companies' lines. Transfers will be given to any line in the city from any other, except in one case, where two lines parallel each other.

TO REMOVE POLES.—The village of Seneca Falls, N. Y., is another one of the places that will soon have all the wires underground. Not only are the poles and wires unsightly affairs, but the wires are a source of danger and annoyance to the firemen in discharging their duties.

WIRES TO BE BURIED.—Subway Engineer Phelps, of Baltimore, Md., recently said that it would not be long before all wires in the city would be underground. The companies are ordering cable now, and the delay is due to the inability to get the cable and to make the house connections.

WINNIPEG, MANITOBA, according to the assessment commissioner's report, shows that the city has an assessed valuation of $12,259,730, from which $823,459.69 are collected in taxes. The assessor's census of the city shows a population of 44,778, an increase of but 2,244 for the year.

CAN PUNCH HIM.—A Chicago judge says that a man is morally justified in punching a man who calls him a liar. He claims that passing the lie is the beginning of an assault, and the man doing so is looking for trouble. The judge says that he will never fine a man who resents the word with a blow.

CIVIC CONDUIT.—It has been proposed in the city of Montreal, Canada, that the council secure the permission of the legislature to borrow money to build a city conduit. Nearly all the railway companies in the cities are anxious to have the city build such a conduit and then lease it to the companies.

CALCIUM CARBIDE A REAGENT.—A method has been invented by which pure metals can be produced from their ores by the use of calcium carbide as a reducing agent. The process is simple and economical, and several alloys can also be obtained directly from the ores containing the necessary metals.

SLOT MACHINES IN COLUMBUS.—Not long ago a large number of slot machines appeared in the saloons of Columbus, O., and soon were merrily at work raking in the nickels, but Chief of Police Tyler ordered them removed at once. The majority of the owners obeyed, and those who did not were attended to later.

SAVES THE CITY COAL.—Superintendent of the municipal lighting plant at Columbus, O., has adopted a plan whereby he can save more than one-third the amount of coal that is ordinarily consumed during every twenty-four hours. By reducing the full stroke and not using a full head of steam, the above saving can be secured.

WOODEN PAVEMENTS.—The Chicago board of local improvements has decided to use creosoted block for pavements in the city. Different kinds of material for paving was looked into by the board, but the decision was in favor of the wood. The first order for this kind of pavement will aggregate about fifteen miles of streets to be paved.

FREE PUBLIC EMPLOYMENT OFFICES, which the General Assembly of the State of Connecticut established in five of its cities, have been pronounced a success by the labor commissioner. During the three months of existence 3,238 applications for work have been received, and 1,643 persons have secured situations, the two sexes being about equally represented.

SOCIALISTS CANNOT SPEAK.—Three members of the Socialistic Labor party, who attempted to hold an open-air meeting to expound their views on Socialism were warned by the police of Hoboken, N. J., not to go on with their meeting without a permit. This permission they could not secure, but persisted in speaking and were arrested for obstructing the streets.

ASPHALT BEDS.—An expert of St. Louis has reported that the asphalt fields of St. Jo, Tex., seem to be a continuation of the asphalt districts of Indian Territory. Samples contained 30 to 45 per cent. of petroleum, and the crude material in the outcrop 60 to 75 per cent. Indications point to the presence of petroleum at a depth of 1,500 feet, and the oil would have a fair illuminating power.

"NO TRAMPS WANTED" is the sign that the police of Chicago, Ill., are about to hang out. The chief of police has announced that no longer will the stations be the place of free board for the "weary willies," and the finances of the city will make it impossible to open the municipal lodging houses this year. "Hobos" must pass on to the surrounding towns or get arrested for vagrancy and be sentenced.

SMOKE ABATEMENT DEPARTMENT.—The city of St. Louis, Mo., has added another department to her city government. The Smoke Abatement Department will carefully consider the work of the leading smoke consumers, but will, of course, recommend no one especially. As it is desired to abate the smoke nuisance by the time the World's Fair is held there, close attention will be paid to the ordinance.

CHEAP TELEPHONES.—The fire and lighting committee of the council of New Orleans, La., has reported favorably on the passage of an ordinance giving a franchise to a telephone company which undertakes to provide 'phones at very low rates. The ordinance provides that within eighteen months 20,000 telephones are to be installed in the city, free of cost, and the rates are to be two cents for the use of a 'phone for a period of five minutes.

ENGLISH CEMENT IMPORTS.—A statement has been prepared showing the amount of cement that was imported into the United Kingdom during the years 1900 and 1901. The total for 1900 was 8,627 tons, of which amount France imported seven tons, Holland 492, Germany 1,122, and Belgium 7,006. In 1901 the total was 21,249 tons, and Belgium again led with 16,943 tons, Germany sent 1,915, Holland 1,626, France 475, and Denmark, 290.

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CONSUMPTIVE HOSPITAL FOR CITY.—That portion of the Manhattan State Hospital located on Blackwell's Island, New York, N. Y., containing 850 insane patients, will soon be turned over to the city of New York by the State Commission in Lunacy. The city may use these buildings as a consumptive hospital. The State Board of Health considers this a proper step as the large proportion of consumptives in the State are located in New York City.

♠

SANITARY RULES EFFECTIVE.—By the rigid enforcement of the sanitary rules the city of Memphis, Tenn., has been raised from an unhealthy city to one of the most healthful. Sewers are kept clean by constant flushing, and the garbage, in place of being dumped into the river, as was formerly the case, is now burned. The latter system of disposal is not only infinitely better for the city, but is much cheaper, thirty-five cents a ton being saved over the old method.

♠

DO AWAY WITH WINE ROOMS.—Mayor Harrison, of Chicago, Ill., has sent a message to the City Council urging the passage of an ordinance forbidding the establishment of wine-rooms or private apartments in any saloon in the city. The Mayor claims that the public morals suffer more damage from the wine-room than from any other cause. The evils are apparent, and the abolishing of these rooms would not be a hardship to any reputable saloon-keeper.

♠

ACETYLENE POPULAR.—In Germany there are 200,000 plants for the production of acetylene gas, and thirty-two cities light their streets with this gas. The production of calcium carbide is growing continually, the amount manufactured last year being 20,000 metric tons. It has been found that acetylene gives at least four times the amount of lamp-black as oil gas, is free from tar compounds and is well adapted for printing.

♠

AN OFFICIAL "SMASHER."—On account of the many obstructions that had been erected in the streets of Grand Rapids, Mich., by the side shows at the exposition in the city, and which were not removed on orders, Highway Commissioner William Walsh and his men sallied out against the offending structures and soon had the enemy laid low. Neat piles of lumber at the sides of the streets were all that were left of what had been festival features in those localities.

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OIL TO LAY STREET DUST.—Columbia, S. C., has been experimenting with oil on the macadam roadways to lay the dust. The first application of oil was made last June, and, after a summer's heat, there is very little dust on the street. The cost of the oil used was about $36 per block, and three applications will lay the dust for a year. Besides settling the dust, the oil acts as a water shed and renders the road springy so that metal tires run over it as smoothly as rubber tires.

♠

THE GATHERING OF CIGAR BUTTS is to be suppressed, according to an ordinance recently passed in the council in the city of Chicago, Ill. The penalty for violation of this ordinance has been fixed at a fine of not less than $10 nor more than $100 for each offense. The law covers the manufacture of cigars, etc., from tobacco thus collected, and no one shall buy or receive such material. There is a movement on foot in New York and other cities to prohibit this nefarious practice.

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DEVOTIONAL EXERCISES IN THE SCHOOLS of Cleveland, O., has been a cause of worry to the School Council. At first the council ordered certain exercises in each school, but public pressure was so great that this had to be rescinded. Then certain clergymen in the city accused the Council of cowardice in revoking the order. Beset on all sides the Council turned the matter over to the superintendent of schools, hoping that he would settle the trouble. Those against the exercises threaten to prosecute any teacher who forces children to pray. The end is not yet.

♠

PROTECTION TO SEAMEN.—The London (England) County Council has recently passed some laws in accordance with the Merchant Shipping Act of 1894, relative to the protection of seamen from imposition. Two sections of one of these laws provide that no building or portion of a building which is connected with a public-house shall be licensed as a seamen's lodging-house, and that no one shall hold a license to sell liquor who is engaged in the business of a clothier, outfitter or slop-dealer; nor shall any house used for any of these occupations be licensed as a lodging-house.

♠

PAY NO WATER RENTAL.—It has been estimated that there are over 40,000 premises in Philadelphia, Pa., that contain water fixtures for which the owners pay no rental to the city. The recent inspection by the authorities places the amount at that figure. The last previous inspection was made sixteen years ago, and the large amount of water that has been apparently wasted by the city can be accounted for in this manner. Without notice or permits, plumbers would place fixtures in houses, and consequently the owners were able to avoid the payment of additional charges for water used.

♠

TO AMEND METHOD OF REGISTRATION.—At the November election the people of Pennsylvania will vote on an amendment to the constitution of the State, which, it is hoped, will pave the way for legislation compelling personal registration. It is so worded that voting may be by ballot or otherwise, so long as secrecy is maintained. There seems to be no opposition to the amendment, unless it were the political organization now in power, but the organizers of the movement felt that, were the people thoroughly informed of the significance of the reform, there would be no difficulty in its adoption.

♠

HAVANA'S SEWERS.—Bids for the paving and sewering of the city of Havana, Cuba, have been opened, and it was found that the lowest bid was made by S. P. McGivney and R. T. Rokeby, of Jersey City, at $10,649,626. The highest was by the Pan-American Construction Company, of West Virginia, the bid being in the name of C. A. Palmer and M. J. Dady, at $11,485,896. This is the second time that there has been bids made for the work, and this time the lowest bid is just within the estimated cost of construction. Four of the tenders were only 6 per cent. above the estimate of the engineers' department.

♠

DOUCHE BATHS FOR THE POOR.—The bath committee of Bradford, England, have been considering the adoption of needle and douche baths in the public bathing houses in place of the old style slipper baths. Not only will the consumption of water be less with this new kind, but the bath will accomplish much more good. The old baths required from forty to fifty gallons of water per bather, while not more than a dozen need be used in the new. The bather will have full control of the water both as to heat and quantity, and the bath will be much more invigorating, as fresh water will be playing on him all the time.

♠

MORE GOOD ROADS.—The last report of Edward F. Bond, Engineer of the State of New York, reviews the work of road improvement in the State. In the last three years twenty roads, with a mileage of forty-five, have been improved, at a cost of $367,600; thirty-six roads, aggregating 122 miles, are undergoing improvement at a cost of $773,730; and seven miles of road are soon to be improved as the funds are available. When all the roads that have been suggested for improvement are finished, 310 miles, at a cost of $2,289,374.35, will have been improved. The State bears one-half and the counties the other half the expense.

CAR MEN'S MUTUAL BENEFIT SOCIETY.—The employees of the Metropolitan Street Railway Company of New York City have just held the fifth annual meeting of their Mutual Benefit Association. The objects of this society is to secure to the sick medical attendance and one-half of their wages, and, in event of death, $150 to the nearest relative. The dues are only fifty cents a month. The treasurer's report shows that there are 4,071 men in the organization, and that $61,218 has been paid to members in benefits. The association had a balance in the treasury of $7,673, and owned $16,000 worth of railway bonds and property worth $8,000.

FRANCHISE TAXES.—The State Tax Commissioner of New York has made public the valuations placed upon special franchises of corporations. For 1901 the aggregate is $256,150,765, over $10,000,000 less than last year. In New York City this year the valuations amount to $211,334,194. The decrease in the tax is laid to the fact that an amendment to the franchise law was passed last year providing that the street and highway crossings of the corporations of less than 250 feet in width shall be taxed by the local assessors instead of by the State. The valuations in some of the other places are: Buffalo, $13,398,848; Rochester, $5,194,685, and Utica, $964,350.

TREES AND WALKS NEGLECTED.—The citizens of Los Angeles, Cal., have made many complaints on account of the condition of the walks and trees. The former are, in many places and especially in front of vacant lots, conspicuous by their absence. Property owners, who have terraced front yards, allow the rain to wash the dirt from these down on to the sidewalks and do not attempt to remove it. A rain, consequently, turns the walks into mud holes. The police have made no attempt to remedy the matter, nor do they look after the condition of the shade trees. The lower branches of these are allowed to grow so low that it is impossible to walk under them without stooping down. It is the duty of the police to remedy this nuisance, but nothing has been done.

EXPOSITION AT TURIN.—The International Exposition of Modern Decorative Art will be held at Turin, Italy, in 1902, and many American societies and firms are intending to have representation there. Notable among these societies are the Architectural League of New York, the Municipal Art Society of New York, the National Arts Club of New York, and the Park and Outdoor Association of America. All the elements that are in the lines of industrial and applied art are comprehended in this congress, and the exposition is certain to have a beneficent influence on the arts and crafts of many countries. It is the purpose of the United States Commission to have the United States section as representative and notable as possible. All who are interested in these matters are urged to contribute and co-operate in the work of the commission.

LOUISIANA PURCHASE EXPOSITION.—Contracts amounting to $11,000,000 for constructing the buildings and laying out the grounds of the exposition at St. Louis, Mo., in 1903, will be let on December 1; $7,000,000 will be spent on the buildings and $4,000,000 on the grounds. The site of the exposition will be the unfinished half of one of the large parks, and this has been surveyed and the lines of the buildings and avenues staked off. The National Arts Club of New York, together with other societies of a kindred nature, have suggested to the authorities of the exposition that the buildings be so arranged and grouped that they will represent a model city, and that the roads and accessories in the grounds be models of their kind. This could be done without additional expense, and the exposition would then be an object lesson to the country as to how they should build their cities.

PHILADELPHIA'S CONTRACTS.—The way that contracts have been let in Philadelphia, Pa., has been the cause of much criticism of the present administration. Instances have been given in which the matter of haste in the accomplishing the work contemplated has greatly outweighed the pecuniary side of the question. Daniel J. McNichol received the contract for the Torresdale conduit for $1,274,000, the work to be done in nine months. Another bid was submitted, $27,869 less than McNichol's, the time limit being fifteen months. When McNichol received the contract he sublet it to the other bidders, giving them the time they asked for in their bid. Clauses in the municipal contracts forbid sub-letting, but these were overlooked. Thus it seems that McNichol made a good thing out of it without doing a stroke of work, and the city paid nearly $28,000 for the transfer.

PRECAUTIONS AGAINST DISEASE EPIDEMICS.—The London (Eng.) School Board have adopted an excellent code by which precautions are to be taken in case of an outbreak of an infectious disease in any school. The head teachers in the schools are held responsible for the carrying out of the following regulations: All premises must be ventilated during school hours, and after the children have gone home; rooms are to be washed every three weeks; if a child comes to the school in a dirty condition, he must wash at once, or, if further cleansing is necessary, be sent home for the purpose; each child must have his or her separate hook for clothing; any bad smells are to be reported at once to the head office; urinals and drains must be sluiced twice a day, at noon and in the evening; any disinfecting necessary must be done by the local authorities. Any child showing symptoms of any well known infectious disease, the names of which are mentioned in the full code, must be sent home at once and the Superintendent of Visitors notified immediately, as also the medical officer of the district.. Precautions are taken to keep away from school any children liable to be infected by the sick child. Such children must stay away during the recognized period of the development of disease and secure a certificate from the health officer before being allowed to return to school. Teachers are supplied with a list containing the general symptoms of diseases, so that they may recognize them readily, and accurate registers must be kept of the absences of children, with the causes of their absences and the precise character of the disease.

CHILDREN'S LIBRARY WORK.—At the convention of the American Librarians' Association, held at Waukesa, Wis., July 4-10, much interest was taken in the discussion of the work in children's sections. One librarian cautioned against fairy stories in which the author tries to be smart, and in which the atmosphere of unbelief on the author's part is apparent. She also made a strong plea for the personal knowledge of books on the part of the librarian before they were placed in the library. Books should be taken on approval first before they were purchased, so that their contents could be ascertained. She claimed that there seemed to be a feeling that a child's own tastes should be the guide as to his choice of books, but, while this was true to a certain extent, when it was seen that a book was not doing a child good, although he had chosen that kind, it should be the duty of the librarian to learn what it was that appealed to him and then find other books containing this thing, but which were better written and lacked the objectionable features. It was stated that there was a tendency, in order to have enough books to meet the demand, to buy entire series instead of getting them for inspection and criticism by those conversant with art and literature, rejecting those books that they condemn. Another subject that came up for discussion was how best to teach the children to use the library as a means of reference, so that they could learn to hunt up matter on any subject. It was admitted that this was the object of a library. The question was, how should the line be drawn in this matter between the library and the school? One librarian suggested that the formal instruction should be given in the schools, being supplemented by sympathetic work of the libraries. Others expressed opposite opinions. As to the discipline that should be maintained in the children's room, it was the opinion of the conference that the discipline should be firm, but rather implied than arbitrary. Children should be taught to be courteous. Remonstrate with them at first, but if they continue to be unruly, eject them. In another discussion on the library versus the school, it was pointed out that the teachers should be trained in the plans and methods of library work, and that the librarian should keep in touch with the great educational movements of the day in children's departments, shaping their work to meet the needs of the hour.

STREET LIGHTING IN NEW ENGLAND CITIES*

	No. lights. Arc.	Incand.	Price. Arc.	Incand.	Hours lighted.	Contract.
Danbury	121		$82.50		moon scale	
New London	300		90.00	$20.00	all night	
Bristol	65		77.00		12 M.	5 yr.
Stamford	50	556	98.00	22.00	all night	5 yr.
Bridgeport	482		91.25		all night	5 yr.
Wallingford	86		57.00		3 all night	
Hartford	771		75.00		all night	5 yr.
Willimantic	84		97.11			7 yr.
Derby	66		57.00	$25 & $16	12:30 A. M.	10 yr.
Springfield	700		75.00		1 A. M.	5 yr.
Naugatuck	66		75.00			1 yr.
Norwalk	92	11	74.00	18.00	3 A. M.	3 yr.
Putnam	46	33	$5,000 per yr.		3 A. M. avg.	1 yr.
Ansonia	71	6	60.00		12:30 A. M.	
Meriden	190		110.00		dusk to 3:30	
Waterbury	215		100.00		all night	5 yr.

* Data collected by the officials of New Britain, Conn.

CITY AND TOWN STATISTICS

City or town.	Population. Census of 1900.	Rate of taxation.	Cost of labor per day.	Gas or electricity.	Water works.	Approximate cost of anthracite steam coal. Pea.	Buckwheat.
Athenia, N. J.	2,000	Low.	$1.50	N	Y	$3.00	$2.50
Avoca, N. Y.	1,106	Low.	1.50 to 3.00	N	Y	3.60	2.50
Bangor, Pa.	4,106	Low.	1.50 to 2.00	B	Y	3.20	2.50
Bennett, Pa.	4,000	Low.	1.50 to 2.00	E	Y	2.00	1.50
Berwick, Pa.	3,916	.0022	1.40	E	Y	2.15	1.60
Bloomsburg, Pa.	6,170	.02	1.25	B	Y	2.15	1.65
Binghamton, N. Y.	39,647	2 per cent.	1.50	B	Y	3.50	2.50
Boonton, N. J.	3,901	.0023		E	Y	3.00	2.50
Candor, N. Y.	1,500	.0075	1.10	G	N	3.50	2.50
Catawissa, Pa.	2,023	.0018	1.25	E	Y	2.35	1.75
Clark's Summit, Pa.	1,000	Low.	1.25	N	Y	2.90	2.10
Corning, N. Y.	11,061	.02	2.50	B	Y	3.50	2.50
Cortland, N. Y.	9,014	.0175	1.50 to 3.00	B	Y	3.50	2.50
Dansville, N. Y.	3,633	.0072	1.50	B	Y	3.60	2.50
Danville, Pa.	8,042	.0042	1.00 to 10.00	B	Y	2.40	1.75
Dover, N. J.	5,938	.035	1.50	E	Y	3.00	2.50
Elmira, N. Y.	35,672	.025	1.50	B	Y	3.50	2.50
Franklin, N. J.	1,200	.0127	1.20 to 1.75	N	N	3.00	2.50
Fulton, N. Y.	5,281	.00116	1.50	B	Y	4.00	3.00
Greene, N. Y.	1,236	.009	1.50	E	Y	3.60	2.75
Halstead, Pa.	1,404	.006	1.50	E	Y	3.00	2.10
Homer, N. Y.	2,381	.008	1.50	B	Y	3.50	2.75
Horseheads, N. Y.	1,901	.01024	1.15 to 2.00	N	N	3.50	2.50
Ithaca, N. Y.	13,136	.0026	1.50 to 2.00	B	Y	3.50	2.75
Kingston, Pa.	3,846	.005	1.25 to 2.50	B	Y	2.25	1.00
Lancaster, N. Y.	3,750	.00634	1.50	E	Y	3.60	2.50
Lestershire, N. Y.	3,111	.025	1.50 to 2.00	B	Y	3.50	2.50
Little Falls, N. Y.	10,381	.0184	1.25 to 1.50	E	Y	3.00	2.50
Lyndhurst, N. J.	2,000	.0268	1.75	B	N	3.00	2.50
Marathon, N. Y.	1,092	.015	1.50	E	Y	3.25	2.75
Montrose, Pa.	1,827	.003	1.50	E	Y	3.25	2.10
Mt. Morris, N. Y.	2,410	.009	Low.	E	Y	3.60	2.50
Nanticoke, Pa.	12,116		1.25	B	N	2.15	1.60
Nazareth, Pa.	2,304	Low.	1.50	E	Y	3.35	2.50
New Hampton, N. J.	1,000	.011	1.25	N	Y	3.00	2.50
New Hartford, N. Y.	1,007	.003	1.25	N	Y	3.60	2.75
Newton, N. J.	4,376	.017	1.50	B	Y	3.00	2.50
Northumberland, Pa.	2,748	.044	1.00	B	Y	2.55	1.75
Norwich, N. Y.	5,766	.0125	1.50 to 2.50	B	Y	3.60	2.75
Oswego, N. Y.	22,199	.0272	1.50 to 2.50	B	Y	3.75	3.00
Owego, N. Y.	5,039	.009	1.00 to 1.50	B	Y	3.50	2.50
Oxford Furnace, N. J.	2,800	.0115	1.50	N	N	3.00	2.50
Oxford, N. Y.	1,931	.02	1.00 to 3.00	B	Y	3.60	2.75
Passaic, N. J.	27,777	.0108	1.25	B	Y	3.00	2.50
Paterson, N. J.	105,171	.025	2.00	B	Y	3.00	2.50
Pen Argyl, Pa.	2,784	.015	2.00	E	Y	3.20	2.50
Phillipsburg, N. J.	10,052	.018	1.25	B	Y	3.00	2.50
Pittston, Pa.	12,556	.00545	2.00	B	Y	2.25	1.50
Plymouth, Pa.	13,649	Low.	2.00	B	Y	2.25	1.75
Port Oram, N. J.	2,069	Low.	1.25	E	Y	3.00	2.50
Richfield Springs, N. Y.	1,537	.01	1.00 to 1.50	E	Y	3.75	2.75
Shickshinny, Pa.	1,456	.014	1.25	B	Y	2.80	1.80
Scranton, Pa.	102,026	.012	1.25 to 1.50	B	Y	.40 to 1.00	
Stroudsburg, Pa.	3,450	.015	1.25 to 2.00	B	Y	3.40	2.50
Syracuse, N. Y.	108,374	.0169	1.75	B	Y	3.75	2.75
Taylor, Pa.	4,215	.028	2.00	E	Y	2.00	1.50
Utica, N. Y.	56,383	.011		B	Y	3.75	2.75
Washington, N. J.	3,580	.015	1.50	E	Y	3.00	2.50
Waterville, N. Y.	1,571	.0085		B	Y	3.60	2.75
Waverly, N. Y.	4,465	.03	1.25	B	Y	3.50	2.50
Wayland, N. Y.	1,307	.0055	1.25 to 1.50	E	N	3.60	2.50
West Pittston, Pa.	5,846	.055		B	Y	2.00	1.50
Wilkes-Barre, Pa.	51,721	.01	1.00 to 1.75	B	Y		
Wyoming, Pa.	1,909	.01	1.50	E	Y	2.00	1.50

N—No. Y—Yes. B—Both. E—Electricity. G—Gas.
* Exoneration from taxes for new industries.

LONDON CREMATORIES

THUS far all the cremations that have taken place in London have been performed at Woking, some distance from the city. Another company will open a crematory north of Hemstead Heath, where a beautiful chapel is being built.

The actual cost of cremation should not exceed that required for the average burial as the crematory charges amount to but $25; no grave is required, and the coffin can be a mere shell. If more people were cremated the cost would be reduced, but at present the daily average is not more than one body. The fuel to heat the furnace costs about $3.50, and the expenses for labor for six cremations in one day would not be more than double that required for one. At Hull, where the municipality performs the cremation, the charge is placed at $5.

At all times the remains are reduced to pure white ashes, and the heat is so intense that no smoke or noxious gases are given off. The ashes of an average adult weigh about five pounds, and amount to about a half a peck in bulk. The ashes are placed in all kinds of receptacles, ranging from urns of earthenware to those of precious metals, and are placed in tombs or at times carried to the home of the relatives.

It was in 1885 that the Cremation Society was first allowed to use the crematory at Woking, and in that year only three cremations took place. Opposition to the practice has worn off now, and last year 300 persons were burned. The Roman Catholics seem to be the only religious body that prohibits funeral rites over the ashes of those cremated, but many Catholics, on sanitary grounds, are insisting on this form of disposal of their remains.

It has been objected that cremation destroys all traces of poison and thus aids crime. To this it has been replied that in only a very few cases can the presence of poison be detected at any length of time after death, and that in cremation a rigid system of identification as to the fact of death and its cause is enforced before the body can be committed to the flames. Of course, of the two systems of disposal of bodies, that of cremation must be admitted to be the most sanitary. Even in the ideal burying ground where the soil is light and porous so that the rain will filter down to a great depth and in which the body is placed deep in the ground, there is never any security from contamination both of the air and water. In cremation, on the other hand, all matter that could putrify is destroyed at once, and all that remains is harmless mineral matter.

HINTS FOR PARK SUPERINTENDENTS

The monthly bulletin, which the New England Association of park superintendents publish, is full of valuable hints for those who are engaged in this work. In Bulletin No. 9, Mr. G. A. Parker, the superintendent of Keney Park, Hartford, Conn., gives his experience in burning brush and cleaning up wooded areas. He says in substance that four years ago the work of cleaning up about two hundred acres of land began, and, as the woods had never been cleaned before, the amount of material was astonishing. There was enough water close at hand to control the fire in burning out the brush, as a small stream ran near by, and there were some sixty small pond holes. The fire was easily kept very low and at no stage was there a tree of any size nearer than fifteen feet to the fire, nor was it uncomfortably warm for a person to stand by the trees. At the time, and for a year afterwards, there seemed to be no injury resulting from thus burning the brush, but the second and third years there were found strips of dead bark, or where the bark had fallen from the trunks from four to ten inches wide and six to eight feet long with a healthy healing callous curling over the wounds. Mr. Parker's theory to account for this injury was as follows: As the trees were never too warm to lay one's hand on, the trouble did not come from scorching, but the quantity of brush was so large that the fires were kept burning for two or three days in one place and this continual warming weakened, by evaporation, the living cells of the trees, so that they died the following season, even if not killed at the time, just as the tree is sun scalded in the summer.

This experience taught Mr. Parker to burn nothing in the woods, but to carry everything to a sand pit, or other open area for burning. The brush is carried on a stone-boat, on top of which and across the

end is fastened a good sized stick with holes for stakes. This makes an easy rig to load with one handling, as each man puts his armful directly on the boat. To unload is easier still, as the stakes are taken out and two long poles can push the brush off and onto the fire. The use of the boat seems much better than a wagon, as no ruts are made, it can go anywhere the horses can, men sluing it clear of trees.

The experience of Nathaniel Morton, chairman of the Park Commissioners of Plymouth, Mass., differs radically from that of Mr. Parker. There the brush is burned on the spot on days when the wind is light, and soon after a rain, or when there has been a slight fall of snow. His experience covers a period of ten years and so has time to back it. Great care is taken in selecting the places of burning and very few trees have been injured in the work. When the conditions are unfavorable, carting has been resorted to. In December, 1899, a high wind broke off fifteen to twenty trees of six to twelve inches in diameter about ten feet from the ground. The breaks showed that on the southerly side of the trees, the bark was dead up and down the trunk for several feet and the sap wood some inches in thickness under the bark had begun to decay. Since the damage had been done a year's growth was shown on all the live parts. Professor B. E. Fernow stated that the injury to the trees was caused by the burning action of the sun and wind for three consecutive days of excessively hot, south winds of August after a long drought. It was so hot that the leaves of oaks and other trees withered.

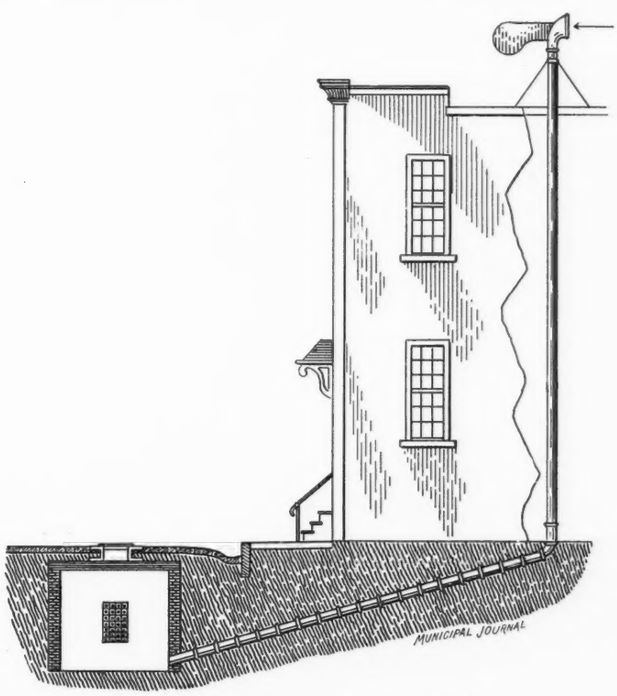
This edition of the bulletin also contains the experience of Mr C. D. Beadle, superintendent on the Biltmore estate, in eradicating the San Jose scale. It had started in the nursery and had gained great headway. The infested blocks in the nursery were burned, as well as the worst cases out of doors. The rest were sprayed with kerosene. Three men went twice over the ground as rapidly as possible with a sprayer. A close watch was kept on all the trees and shrubs and, at the first appearance of the scale on a new area, spraying was resorted to at once. This treatment seemed to extirpate the plague.

The damage to shrubs and trees during the last winter has been considered due to the extreme drought of the summer followed by the protracted cold of the succeeding January and February. The life of the plants was evaporated. Woody plants could not ripen their summer's growth from lack of moisture and so died under the winter's freezing. Had not these two extreme conditions of temperature succeeded each other, no trouble would have ensued, as many of the plants considered perfectly hardy succumbed to the weather.

A VENTILATOR FOR SUBWAYS

By Thomas C. Harris, C. E

THE frequent use of subways under our streets, especially for electric conductors, brings about a condition often dangerous to life and property. I refer to the infiltration of illuminating gas from leaky mains, which may be in the vicinity of the conduits or manholes. Being lighter than air the gas may fill the manholes and rise in the higher parts of the trenches. When mixed with the proper proportion of air the mixture becomes a powerful explosive.



METHOD FOR VENTILATING A SUBWAY

In many cities now putting the wires underground no means of ventilation is provided. Indeed, the whole system is a new one, comparatively, and might be said to be in the experimental stage as yet.

In this city, Baltimore, an extensive system of underground conduits is being installed. They are to carry all manner of electric wires, belonging to the telephone, telegraph, electric light and power circuits, and it is expected to free the streets from the unsightly poles altogether. Some months ago an explosion of gas in the conduits and manholes on our streets did damage to the system and adjoining property to the amount of thousands of dollars. Since then another accident, on another street, resulted in the death of one workman and the serious crippling of two others, who were rescued with great difficulty. I believe that all such subways might be easily and cheaply ventilated. The plan is practically the same method as is employed on all large ships to ventilate the hold and lower cabins below the water line. As shown in the sketch, the manhole has a large terra-cotta pipe, leading from near the bottom to the surface of the ground, terminating in some back yard, or alleyway. From the terra-cotta pipe a vertical pipe of galvanized iron rises above the housetops and carries on its summit a funnel shaped mouth, to catch the wind. A broad wind vane is attached to the funnel, which moves on a pivot, and serves to keep the opening facing the breeze, and so leads the air to the lower part of the manhole.

It is suggested that these ventilators be attached to the lowest bends of the conduit or subway system, and that all manholes in that vicinity be tightly closed. The air entering them will push the gas before it into the higher parts of the line, where it will be allowed to escape as fast as it will.

The scheme appears to be a simple and effective way to drive out the gases, and would be entirely automatic, after once in place. That some breeze is almost always stirring over the housetops is shown by the constantly moving cups of the ammometer in use by the Weather Bureau observers. The vertical pipe, with its wind vane and funnel, may be so located in the rear of buildings as not to be unsightly.

THE PITTSBURG DEPARTMENT AT WORK

President Humphreys, of the International Association of Fire Engineers, at the Head of This Force—Has the Smallest Water Tower in the Country—Made Especially for Use in Alleys

THE reputation of the fire department of New York City as being the finest in the world, or in this country at least, is so well established in the minds of many people that they lose sight of the fact that there are other departments of fire that are the equal, and, in many respects, the superior of the fire fighting force of the metropolis. One of these departments may be found in the city of Pittsburg, Pa. While, in point of numbers, the department has but one-fourth the apparatus which comprises that in New York, the department is thoroughly up-to-date in every way.

In Pittsburg the fire department is known as a "bureau," and is one of the seven that go to make up the Department of Public Safety. Thus the chief engineer of this bureau is responsible to the director of the department and not directly to the mayor, as is the fire commissioner in New York. The present chief of fire is Miles S. Humphreys, who has held the position for several years. It is a strange fact that he never served as a fireman in the ordinary sense of the term, but his administration of his bureau has been of the ablest and the service that his men have rendered the public has been in a great measure due to the personal supervision of their head.

The fire fighting forces of the city comprise about thirty engine companies, including those having chemical apparatus, besides nearly a dozen companies of hook and ladders. The latest addition to the apparatus is a combination water-tower, hose wagon and chemical engine, which is claimed to be the only one of its kind in the country. It matches the big automobile engine now in use, and is one of the most complete pieces of fire apparatus made. The tower can be raised to a height of twenty-three feet, and the chemical tank, which has a capacity of 100 gallons, is situated between the rear wheels under the bed of the wagon. The wheels are ball-bearing and rubber tired, and there are patent friction brakes which can be operated from front and rear. The wagon was built for use in narrow streets and alleys, and is stationed in the down-town district. The accompanying illustrations show some of the apparatus in work at the fire in the Pennsylvania Door and Sash Company's factory in Pittsburg, in which five men were injured, and the loss amounted to $85,000. One of the illustrations shows the champion water tower in operation at this fire. This is the largest water tower in the country, and, as may be seen in the other picture, is throwing a powerful stream into the sixth story window of the factory.

THE LARGE WATER TOWER AT WORK

While the city of Pittsburg has the best of apparatus, the supply of water is not proving adequate for its needs. Fire Marshal McGill is urging the authorities to install a larger water supply and many more fire plugs. He claims that many of the water mains have been underground for many years, and are not fit for use. The number of hydrants is not proving sufficient, and he points out that at a recent fire it was necessary to feed the water tower through 2,000 feet of hose, consequently the stream from the tower was practically useless. His recommendations will be heeded, as the number of large fires that have taken place lately have shown that it is useless to have good apparatus if there is not a large enough supply of water to render them effective.

MASSACHUSETTS STATE FIREMEN'S CONVENTION

THE twenty-second annual convention of the Massachusetts State Firemen's Association was held at the city of Holyoke, Mass., on September 25-27. The visitors were welcomed to the city by Mayor Chapin and Chief Lynch of the local department. The president reviewed the work of the association. He called attention to the fact that the association had representatives from all over the state. During the last ten years the state had appropriated over $10,000 every year for the disabled firemen, showing the influence that the association has with the General Court. The secretary read a paper on "The Care and Training of Horses for Department Purposes," written by Colonel R. S. Russell, Fire Commissioner of Boston. Colonel Russell stated that while some of the horses are put to school, good results are obtained by the training they received in actual work. The originator of the Holyoke Red Cross Corps, Dr. Frank A. Woods, read a paper on "The First Aid in Connection with the Fire Department Work," calling attention to the growth of the work, which was at first received with skepticism. The object of the work is to aid the wounded until the arrival of the surgeon and not encroach on the latter's work in the least. "Sprinkling Systems and the Best Equipment for Fire Protection in Manufacturing Establishments" was the subject of a paper by W. I. Read, of North Adams, who showed that the system of automatic sprinklers dated back to 1723. Statistics showed that the loss in unsprinkled buildings was fourteen times greater than in those having sprinklers.

At the evening session, when the report of the commissioners of the relief fund was read, a lively discussion ensued, and those members who were indifferent to the convention, but not to the benefits of the relief afforded by the association's fund, were severely scored. At the last evening session a paper was read by Chief W. C. Davol, of Fall River, on the laws relating to the right of way and speed of apparatus, and the responsibility for any accidents that might happen when apparatus was driven through the streets. The writer thought that the first consideration should be given to the fire apparatus in right of way and speed, and that the responsibility rested with the drivers as individuals and not as servants of the city. There was some discussion of the subject. Captain William Brophy, of Boston, presented a paper on the "Advisability of Using Storage Batteries in the Fire Alarm Service." Captain Burton Steere, of Springfield,

read an interesting paper on "How Should a Permanent Fireman Properly Equip Himself to Be Eligible to Wear a 'White Hat'?" The fireman should study how the fires are fought and learn all he could about the apparatus and how it was used. Other papers were: "Civil Service in Fire Departments: Advantages and Disadvantages,"

PITTSBURG'S SMALL WATER TOWER IN ACTION

by J. F. McKissock, of Lowell; "A Description of an Ideal Water Supply System for Domestic Supply and Fire Protection," by George F. Chase, of Taunton.

After a vote of thanks had been given by the delegates to the Mayor and the fire department of Holyoke for the way the convention had been entertained, the convention adjourned. The following officers were elected for the coming year: President, Chief John T. Lynch, of Holyoke; vice-presidents, Chief John H. Scott, of Milford; Captain W. S. Adams, of Worcester; Captain J. S. Webber, of Revere; J. S. McKissock, of Lowell; Captain J. T. McEnroe, of Springfield; Captain D. J. Gorman, of Holyoke, and Engineer J. W. McAuley, of Brookline; secretary, D. Arthur Burt, of Taunton; treasurer, Captain H. R. Williamson, of Worcester; executive committee, W. W. Byers, of North Adams; Chief G. H. Johnson, of Brookline, and Captain Burton Steere, of Springfield; commissioners for association relief fund, Chief E. H. Hosmer, of Lowell, and Fred A. Cheney, of Haverhill; delegate to national convention for fire engineers, Chief J. T. Lynch, of Holyoke; sergeant-at-arms, Chief W. E. Cade, of Wakefield.

FIRE, WATER AND POLICE ITEMS

NEW SMOKE HELMET.——The authorities of Liverpool, Eng., have lately adopted a new helmet for the fire department. It is a German patent and in appearance resembles the suits used by divers.

REDUCED FIRE RATES.—Owing to the recent improvements in its fire department, the insurance rates at Indianapolis have been reduced 38½ per cent. But for these improvements the reduction would have been only 23½ per cent.

PAY TWICE A MONTH.—The policemen and firemen of the city of Columbus, O., have started a movement to have pay day come twice a month in place of every month as at present. Many of the councilmen are said to favor the project, and the requisite ordinance may be passed.

SMALL FIRE LOSS.—For the month of September, 1901, the fire loss for the United States and Canada was $7,645,200, or $1,500,000 less than that for the corresponding month last year. Excepting that of the month of June, 1899, it has been the lowest amount of loss for any month for three years.

A CASE OF RED TAPE.—James Roy, chief of the fire department of Watertown, Wis., has been suspended from the department by the Mayor. It is alleged that the chief took an engine and hose cart to Jefferson in answer to a call for aid from that city without obtaining the proper permission.

ST. AUGUSTINE'S (FLA.) FIRE DEPARTMENT has been reported in good condition. Chief Rhodes, realizing the great need of a paid engineer for the two steam engines, and knowing that the council would not appropriate money for the purpose, paid the engineer out of his own funds. The council then gave the chief the required permission.

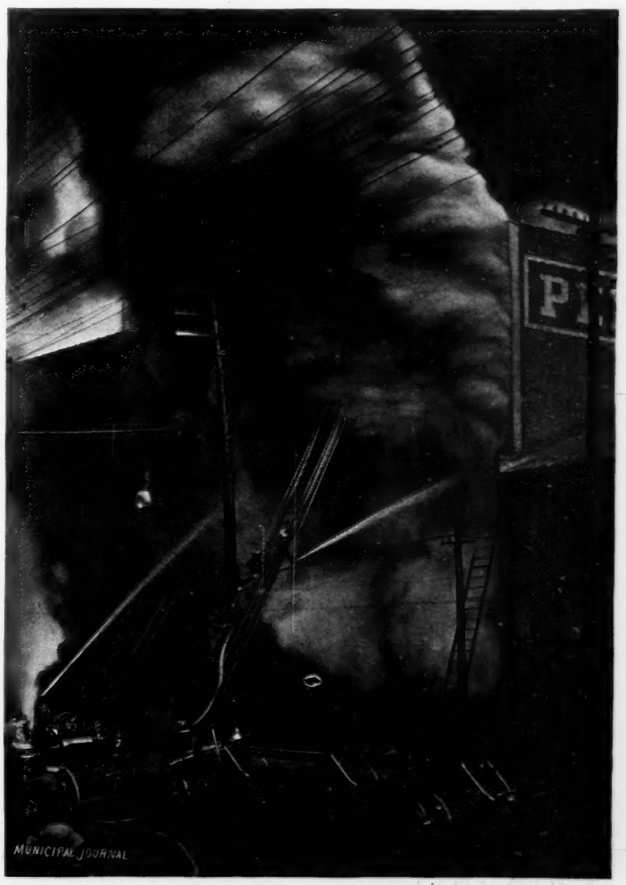
GLASS MOST FIRE RESISTING.—Experiments have recently been made by the Paris Fire Brigade, with the view of ascertaining whether iron, non-inflammable wood, or glass cast on wire would best resist fire. From these experiments it would seem that the glass proved most fire-resisting. The iron warped quickly, and it took an hour to consume the wood.

REDUCED FORCE.—The police of the city of Spokane, Wash., has been reduced to the number of twenty-six men. An ordinance passed by the council last August in accordance with a section of the City Charter is the authority for the reduction. The section referred to gives the police board the power to reduce the force, those removed to be taken from the men last appointed.

POLICE ARTISTS.—In an address by Lord Brampton, published in the eleventh edition of Colonel Sir Howard Vincent's *Police Code*, there is urged the necessity of every member of the Coventry (Eng.) police force acquiring some knowledge of the art of drawing, so as to be able to make rough plans and sketches of footprints and other tracts and marks by which criminals may be traced.

ENGLISH SYMPATHY.—Chief Hale, of the Kansas City (Mo.) Fire Department, has received two letters from Horace S. Folkner, secretary of the National Fire Brigade's Union, and T. C. Dyson, chief of the Windsor (Eng.) Fire Brigade, expressing the sympathy of their respective organizations for the death of the late President McKinley.

CHEMICALS NEEDED.—The annual report of Rufus R. Fanchar, Superintendent of Fire Service in New Haven, Conn., contains a statement that over 70 per cent. of the fires in the city last year had been extinguished by means of chemical engines. More



THE PITTSBURG DEPARTMENT FIGHTING A BIG BLAZE

of these useful apparatus are asked for, and, in view of the good service they have rendered, it seems probable that the request will be granted.

WELL WATER BAD.—In Bay City, Mich., there has been an epidemic of typhoid fever and one of the physicians places the blame for the trouble on the use of well water, as all of his patients suffering from the fever have been users of such water. He states that the city's water is the purest obtainable and even river water, muddy as it is, is free from germs as they cannot live in it on account of its saline qualities.

BURSTING DAM.—The bursting of a dam containing 10,000,000 gallons of water at East Liverpool, O., caused great damage to property and endangered the lives of a score of people. The reservoir had just been completed for the city, and when the water was let into it for the first time it burst. Houses were wrecked, large trees uprooted and the pumping station and engines so damaged that they cannot be used.

OLDEST STEAMER.—Probably what is the oldest steam fire engine in the country is at present owned by the Underwriters' Fire Patrol in Philadelphia. It is used for pumping out cellars and such ignoble tasks. It was built for the Philadelphia Hose Company and went into service in January, 1858. For several years it was in active service and at present is in practically the original condition, although some improvements have been added.

DAILY TESTS NECESSARY.—The absolute necessity of making at least one test of the fire alarm in a town is shown by the negligence of the council of Carbondale, Pa., in providing for such tests. An alarm was turned in from a street box, but the hammer on the bell in the City Hall tower had become stiff from non-use and no signal was given. The firemen did not know of the existence of the fire until it was too late and the damage was done.

HOW TO LESSEN THE NUMBER OF FIRES.—According to experts, the only way that fire waste can be reduced and the fire hazards controlled is for strict investigations to be made into the cause of every fire. This work should be done by property owners and insurance companies alike. Good work is already being done in this direction by trade organizations and the ratio of loss has been reduced and, in several cases, the insurance rates have been considerably lowered.

WATER FOR THE SCHOOLS.—The School Board of the city of St. Paul, Minn., have been endeavoring to find the best method of supplying pure water for the school children. Many methods have been suggested such as distillation, purchase of distilled water, or spring water, filtration and boiling. Filtration, boiling and distillation, if done in the school, require the purchase of apparatus and tanks for storage, boiling, etc. Distillation was considered the best.

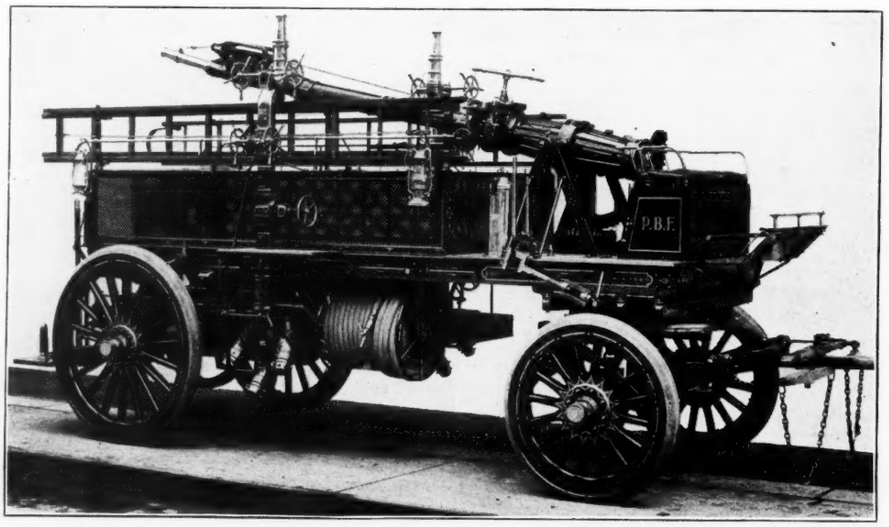
SLOT MACHINES TO BE SEIZED.—The police of Albany, N. Y., have been scared into carrying out the law against slot machines by the threat of Captain Sheridan that he would hold each man responsible for his post and that any machines found by the officers and not taken would be the means of making trouble for the officer before the commissioner. The result of the threat was that the patrolmen visited every saloon in the captain's precinct, but only one machine was found.

BETTER FIRE PROTECTION NEEDED.—The people of Kansas City, Mo., are again clamoring for better fire protection. It is claimed that the mains are so small around the big buildings that water could not be thrown to the top floors even with the aid of the engines. If all the steamers were grouped together near a big fire they would exhaust the supply of water. This knowledge of the inadequateness of the water supply is very disquieting to the owners of the large buildings.

AUTOMOBILE FIRE ENGINES.—At the present time there are seven self-propelling fire engines in the country. Those in the Boston, Mass., department have been in service since 1897 and have proved of great value. Each weigh nearly nine tons, but are easier to handle than those drawn by horses. They answer second alarms and are much better hill climbers than the horse engines. The largest size engines throw an average of 870 gallons a minute, about twice the amount of water thrown by the average horse engines.

BELFAST'S FIRE DEPARTMENT.—The annual report of the Superintendent of Fire at Belfast, Ireland, shows that the number of calls during the year past was 219. The total loss by fire was $163,272.87, being a decrease of $43,378.28, or over 26 per cent. The department brigade has a strength of seventy-eight men, three engine stations, seven sub-stations, six steamers, seven hook and ladders and hose carts combined, an eighty-foot fire ladder and hose cart, four horse hose carts, a salvage trap, seventeen horses and 7,780 yards of canvas hose. The population of the city is 348,339.

AN EFFICIENT FORCE.—For a town of only 6,608 inhabitants Urbana, O., has an efficient fire department. In his annual report Chief George M. Kellogg states that the total loss by fire for the year was $106,233.91, the insurance being $90,008.91. Over one-half of this loss was in two fires which were outside of the fire limits where there was no water pressure. The department answered 162 alarms. There are in the service four hose wagons, three chemical engines, one aerial truck, one steamer and, in reserve, one hose cart and one city truck. At the beginning of the year the council allowed the department $27,000 and the chief managed to keep the expenses down to within a few hundred dollars of this amount.



PITTSBURG'S NEW WATER TOWER. SMALLEST IN THE COUNTRY

THE VIRGINIA STATE FIREMEN'S ASSOCIATION held its fifteenth annual convention at Staunton, September 25-26. Judge Hoit welcomed the visitors to his city, praising the work of the firemen. In his reply, R. W. Withers urged his hearers to impress the value of the judge's words upon the members of the Legislature. James H. Dwight, of Harrisonburg, read a paper on annual conventions. Another paper by James M. Long, of Winchester, dealt with the state fire marshals, advocating the creation of such an office in Virginia. The role showed a membership of 1,400. Portsmouth will be the scene of the next meeting. For the coming year the officers will be: President, Captain Emmet Deans, Portsmouth; senior vice-president, L. G. Lookabill, Roanoke; secretary, G. G. Cummings, Portsmouth; treasurer, T. J. Williams, Charlottesville; statistician, R. W. Withers, Suffolk.

CAMDEN'S FIRE DEPARTMENT.—The annual report of Chief Samuel S. Elfreth, of Camden, N. J., for 1900, shows a force of seventy-one men, five steamers, four hose carts, one aerial truck, two sixty-gallon double tank chemical extinguishers, etc. The Chief asks

that a new second-class steamer be purchased to take the place of the one that has been in use thirty-one years. The total number of fires was 149 with a total loss to buildings and contents of $203,989.29, or a per capita loss of 2.56.

EDINBURGH FIRE BRIGADE.—The report of the Firemaster of the city of Edinburgh Fire Brigade for 1900 contains some interesting statistics relative to the service rendered by the fire department in that Scottish city. The brigade received 622 calls, of which 415 were to fires in the city and twenty-five outside the city limits. The remaining 182 were chimney fires and false alarms. The loss by fire upon houses in the city amounted to $226,015, fully insured. Of the fires, 172 were petty, with a loss under $25; 161 were between $25 and $250; seven of the fires ranged from $5,000 to $15,000, and but one was over the latter sum, namely, $110,000. For its services outside the city the department was reimbursed to the extent of $1,700. There were but four cases of deaths at fires during the year. The department consists of three steam engines, four horsed hose carriages, fifteen hand hose carts, thirty-three hand pumps and 28,100 feet of canvas hose.

ABOLISH FIREMEN'S DORMITORIES.—Chief E. A. Kimball, of the Springfield (Mass.) Fire Department, read a paper before the convention of the Massachusetts State Firemen's Association held at Holyoke, Mass., in September, on the improvements that are needed in the housing of firemen in fire stations. He claims that the matter of suitable, healthful and convenient quarters for the men is of the most vital importance not only to the firemen, but also to the service. If the horses are not all bunched in one stall, why is it not right that the firemen should have separate quarters? It costs more to have separate stalls for the horses, but it is necessary on account of the confusion that would result if it were not done. So in the case of the men. From the standpoint of health the men should not be all herded in one room where they are forced to breath bad air, but each should have his own room well ventilated and in which he can have some privacy. To provide separate rooms will, of course, cost a little more money, but the improvement would be worth the expense. They should be so arranged that those men who must be first on the floor of the house could reach the sliding pole immediately, the others to follow. The element of sentiment comes into such a provision for separate rooms, but anything that will increase the comforts of the men and provide for them pleasant and agreeable surroundings in which they can have a personal interest, cannot but add to the efficiency of the service.

READING'S WATER WORKS.—The annual report of Superintendent Neubling, of the water supply of Reading, Pa., shows a department that is well managed. The finances are in a good condition, all bills having been paid and a balance remaining in favor of the department of $42,984.28. The revenue of the board amounted to $162,463.65 from all sources, while the expenses were $152,955.06. During the last year the total consumption of water through meters was over 902,000,000 gallons, an increase of 121,000,000 gallons over the preceding year. The meterage service is growing rapidly and is giving great satisfaction. At present there are 719 meters in use, several of the consumers having purchased their meters from the department. The city of Reading has a population of 79,520, and all but 100 of these are supplied with water. The total consumption of water for the year was over two and one-half billion gallons, thirty-eight per cent. passing through the meters. The average daily consumption was 7,285,000 gallons, being a per capita consumption of 91.7 gallons. The pumps are of the Worthington type, each pound of coal pumping 263.8 gallons. Figured on expenses, the entire cost of pumping was $11,215.89 per million gallons raised against the average dynamic head of 280.2 feet into the reservoir, $8.68. The total capacity of the six reservoirs is 181,532,000 gallons. The superintendent calls attention to the great damage done to the water mains by the escaping current from the trolley systems and advocates the introduction of compulsory meterage.

CENTRAL WATER WORKS ASSOCIATION

THE Central Water Works Association held its fifth annual convention at Evansville, Ind., on October 1-3. On the morning of the first the delegates assembled in St. George's Hotel whence, preceded by a platoon of police and a band of music, they were escorted to the place of meeting in the Business Men's Association Hall. President Harvey Cockel, of Columbus, O., was in the chair. The Mayor of Evansville addressed the assemblage, welcoming the delegates to the city. President Cockel responded, thanking the Mayor for his words of welcome, and then came the reading of the reports of the treasurer and secretary.

The first paper read was that by Mr. Mathews, the City Solicitor of Dayton, O., on "Electrolysis." Mr. Rowe read the paper for Mr. Mathews, who afterwards read another paper on "Electrolysis of Underground Structures," written by L. C. Anderson, of Franklin, O., which embodied experience obtained in the village of Franklin, where the water pipes had been badly damaged by the escaping currents of electricity. He stated that a service pipe had been so damaged in six weeks' time that it had to be replaced. In the lawsuit brought by the village against the railway company the jury found that the village officials were responsible for the damage done as they did not, in the franchise to the company, provide against this damage, and the court held that the officials were guilty of contributory negligence.

Mr. C. W. Wiles, of Delaware, O., read a paper on "Central Station Heating." In the afternoon the members took a trolley ride around the city and ended with a barbecue at Cook's Park.

On the second day of the convention the election of officers was held and resulted as follows: President, Joseph J. Pater, Hamilton, O.; first vice-president, Joseph T. Blair, Cincinnati, O.; state vice-presidents, George McIlhenny, Evansville, Ind.; W. H. Glore, Covington, Ky.; T. H. Morton, Nashville, Tenn.; Henry Burton, Port Huron, Mich.; S. F. Tompkins, Joliet, Ill.; Clark Howell, Charleston, W. Va.; secretary, William Allen Veach, Newark, O., (re-elected); treasurer, Charles E. Rowe, Dayton, O.; (re-elected); executive committee, C. W. Wiles, Delaware, O.; A. W. Evans, Zanesville, O.; W. H. Stephens, Lima, O.; finance committee, T. R. Cook, Toledo, O.; John Langan, Tipton, Ind.; A. W. Inman, Massillon, O.; editor, Lehman B. Hoit, Cleveland, O.

Indianapolis, Ind., was selected as the next place for holding the convention. After some new members were elected, Mr. Charles E. Rowe, of Dayton, O., started a discussion on pure water and spoke of the trouble he had been having with the Hamilton, O., water works. The City Council had placed the gas works between the source of supply and the intake and so spoiled the water with the waste products of the works. He also pointed out the interesting fact that water, after it has run through the pipes and sewers of a city, will purify itself after flowing some time in the river again and be fit for use by another city.

In the afternoon the members visited the dry well where, sixty-five feet below the surface of the earth, is located the machinery for the water works plant. Later the fire department entertained them with an exhibition drill and the members drove about the principal streets of the city. The Manufacturers' Association entertained the members in the evening. A vote was then passed tendering to the city the thanks of the association for the royal welcome given the delegates.

On the third day papers were read by members as follows: "Tastes and Odors in City Waters," by S. J. Hoggson; "Lifting of Water by Compressed Air," by John Langan, and "Pure, Wholesome Water —How Obtained," by C. Monjeau. Secretary Veach made an informal report in behalf of the committee on uniform system of municipal accounting. The committee was appointed a year ago to look up this matter and decided to recommend the system adopted by the New England Water Works Association. The committee was asked to continue another year in their research. In commenting on Mr. Monjeau's paper, the president said that the subject was one of the most important that fell to the lot of city officials. He hoped that at the next convention there would be read a paper on the aeration of water, and went on to explain the great necessity for this when water is used from wells. After some discussion of this subject the convention adjourned.

CURRENT LITERATURE ON MUNICIPAL TOPICS

Reviews of Some Important Books—What the Magazines and Reviews Have to Say About Civic Affairs—Municipal Reports Received

A BIBLIOGRAPHY OF MUNICIPAL PROBLEMS AND CITY CONDITIONS. By Robert C. Brooks. Published by the Reform Club, 52 William street, New York. 8vo., 354 pages; bound in cloth. Price, postpaid, $1.50.

To attempt to compile a complete bibliography on a subject that has such a field as that with which this book deals would be a task impossible of achievement. The best that one can do is to tabulate all the matter available that has been written bearing directly on the different heads under this caption, leaving to subsequent editions the addition of matter that is constantly being published in one form or another. To do this in itself would be an undertaking of the greatest magnitude, but Mr. Brooks attempted it and with great success. He has made his work as comprehensive and catholic as possible, noting both the good and the poor writings on the subject. Entries are made of over 12,000 books, pamphlets, reports and papers that have been published in Europe and the United States, and the author's list contains nearly 4,000 names and 7,500 references. Titles have been arranged topically, and the classification is made according to countries and cities. All topics that were impossible to classify on account of their lack of reference to any city, country or single topic, together with important general works, are grouped under one head. This edition of the work contains about four times the matter in the previous one, and is complete down to January, 1901. Dr. Milo Roy Maltbie, editor of *Municipal Affairs,* rendered valuable assistance in compiling, which is acknowledged in the preface. No library is complete without this volume and no city official of large responsibilities nor student of civic affairs will wish to be without it.

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Volume II of the *History of Enfield, Connecticut,* by Francis Olcott Allen, deals with the Treasurer's Book, Selectmen's Accounts, Church Records, Births, Marriages and Deaths. The Treasurer's Book runs from 1714 to 1805, and in this are recorded all the money that was paid out and received by the official, the entries being made in the quaint, abbreviated style of the olden times. The Selectmen's Accounts was a book of accounts between the town of Enfield and the town treasurer, started in 1741 and carried down to 1801. All orders that were made for the expenditure of the public moneys appear in detail in these pages. The church records are often very amusing, although written in all earnestness, and, from the many omissions, that are indicated by brackets, the books are not now in the best condition.

Then follows a historical narrative of the rise of the "Strict Congregational" churches in Connecticut, with an introduction by James Allen Kibbe, of Warehouse Point, Conn. This narrative was written in 1781 and was published by order of the churches of the denomination described. The town records of the place are next given, and the books are evidently in good condition as the omissions are few. They were begun in the year 1682, and continued down to 1848, when a new kind of report, in tabular form, was adopted, giving more particulars. According to the old law of the State, it was necessary for people to record their intention of marrying, so we find a list of those who did so, beginning in 1725, and continuing for twenty-five years. The first recorded marriage that is left in the old book was in 1682, between Samuel Terry and Hanah Morgan, and from that time the record is complete to date. Lot Killum was the first to die in Enfield, and he departed this life in 1683 at the age of "between forty and fifty years." A voluminous index at the end of the volume makes it easy to find what part any of one's ancestors had in the history of the town.

* * *

What is probably the most important question with which the large municipalities of the world have to wrestle is how shall the great increase in the city's population be so disposed that unhealthful conditions from overcrowding may be prevented. Much has been written in trying to solve the problem. *Public Health and Housing,* by John F. J. Sykes, M. D., deals especially with the influence of the dwelling upon health in relation to the changing style of living. The author treats this great question systematically, showing the kinds of houses that exist in the crowded sections and the good and bad construction of each. His book is divided into three parts, treating respectively of the known effect that certain conditions of living have upon health, construction and misconstruction of houses, and their use and misuse. Under the first head, may be mentioned the density of population both as to square and cubic space, and many tables are given showing the density of various sections, mortality tables, etc. He then shows how different dwellings affect the health of their occupants and the defects in construction. "Construction and Misconstruction is an exposition of the classes of buildings according to their construction and arrangement in blocks and streets and the economies, practiced to use all space possible. Under "Usage and Misusage" houses are classified according to use, the pressure of population and the consequent necessity of tenements. A brief review of the housing question completes the work. Published by P. S. King & Son, Orchard House, Westminster, London. Price, five shillings, net.

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SEWERAGE. THE DESIGNING, CONSTRUCTION AND MAINTENANCE OF SEWERAGE SYSTEMS. By A. Prescott Folwell, M. A., Soc., C. E. New York: John Wiley & Sons. 8vo., cloth. $3.00. 4th edition.

This is a work that, while primarily intended for practising engineers, has been arranged with the idea that it might be used as a text-book in engineering schools. The book is divided into three parts, treating separately of the three subjects in the sub-head above. In Part I the author gives the different systems of disposing of sewage, with the good and bad points of all; the flow in sewers, design and detail of plans of water carriage systems and the estimate of cost, etc. Under Construction, in Part II, is told how to lay out the work, and to oversee it. Maintenance, in Part III, deals with the problem of treating sewage, preventing nuisances and the destruction of the dangerous portions of waste matter. Valuable tables are given throughout the work, and illustrations show the more important tools and methods of construction of sewer building.

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THE WHEREWITHAL; OR, NEW DISCOVERIES IN CAUSE AND EFFECT. By Townsend. Published by the Wherewithal Manufacturing Publishing Company, Philadelphia, Pa.

This little book of ten pages is little in size only. The thought involved is compassed by the confines of the universe. This system is, to say the least, unique, and one's interest in it grows as it is better understood. Seven questions are given that can be applied to every subject, and, if these are carried out to their fullest extent, each subject will have been mastered in its entirety. These seven heads are: Cause or source, essential, association, incident, illustrates, effect and conclusion. For each of these, under any given subject, are suggested the germ thought of that portion of the subject. This germ is left to the reader to work out in full with the assurance that, if this be done, he will have finished with it and may pass on to the next question. The idea of the system is to so direct one's reading, thought, study and observation by suggesting the proper lines that a complete chain of thought and expression will be built up and limited only by personal effort. The book is a protest against the faulty methods of teaching and thought with their fruitless results. The system strikes one as being rather too abbreviated in suggestion, and that the sentences which go to make up the germs are not comprehensive enough to cover every branch of the subject. However, the idea is certainly worth more than a moment's thought and will no doubt repay trouble spent in its consideration.

For any one who wishes to know about corporations and their securities a copy of *Moody's Manual of Corporation Securities* is all that is needed. It is published by John Moody & Company, 35 Nassau street, New York City, and the price is $7.00. The volume of 1,500 pages is published annually, this being the second number. An alphabetical index is the key to the whole publication. In this every subject, every corporation and every security is separately indexed. This alone is a thing seldom found in a book of reference in such a complete form. It is claimed that one can find what one wants even if one does not know what one wants. The book is invaluable for the financial end of a city's government.

* * *

THE YEAR-BOOK OF THE SCIENTIFIC AND LEARNED SOCIETIES OF GREAT BRITAIN AND IRELAND. Charles Griffin & Co., Exeter street, Strand, London. Price 7s. 6d.

This issue of the Year-Book is a chronicle of the work of the societies done during the last year. It is its aim to be an account of scientific work, a record of progress, and a convenient hand-book of reference. As the list of papers have, in most cases, been contributed by the societies its accuracy can be relied on and, when papers are not given, their absence can often be attributed to the fact that the society does its work in another way. To those who are familiar with previous editions of this work there need be no word of recommendation given, to others a perusal of a copy of the book will convince them that the value of the work is not overrated.

* * *

The reports of the *Proceedings* at the meetings of the *National Municipal League* held at Columbus in 1899, Indianapolis in 1898 and at Milwaukee in 1900, and which are edited by Clinton Rogers Woodruff for the League, form three volumes that would be of the greatest value to all who are interested in good government. These meetings of the League bring together the strong and earnest men in the country, whose endeavors have been to make effective their conceptions of municipal government by intelligent co-operation. Not all can attend these meetings and hear for themselves the papers and addresses that are there presented, but in these volumes that are subsequently published there are given the proceedings and one may have the chance to study at leisure the opinions and experience of the writers and speakers. The books can be obtained from the secretary of the league at his office in Philadelphia at the price of $1 per volume. In the proceedings of the Columbus conference will be found papers by Frank J. Goodnow, Horace E. Deming, Walter S. Allen and others equally well versed in the subjects which they have treated. Here, too, is appended the report of the committee appointed to draw up a "Corporations Act," embodying their recommendations as to the best way of providing for the government of a successful municipality. All these volumes form as nearly complete a summary of existing American municipal conditions as is to be found anywhere. The work of the committee on this "Municipal Program," which included the work on the "Corporation Act," will be continued and reported at each meeting of the league. A number of papers in the proceedings of the Milwaukee conference relate to the "Program" and its relation to the various phases of the subject in different portions of the country. The books are neatly bound in cloth and are a necessary addition to the library of every one who has at heart the best interests of his city or town.

* * *

Those who intend visiting London for the first time, and even those who have been there before, should not fail to procure a copy of *Gillig's London Guide* at the small price of two shillings. The fifteenth edition, for 1901, is larger and better than ever. Here one will find interesting accounts of all the historic spots in and about the city, where to stay and dine, and how to see the town in the shortest time without missing anything. The author of this volume has charge of the "American Rendezvous" at 2 Cockspur street, Trafalgar Square, Charing Cross, London, where this guide is published, which can be made the headquarters of the traveller while abroad and to which he may have his mail sent to be held for him or remailed at his convenience.

FINANCIAL REFORM ALMANACK, 1901. The Financial Reform Association, 18 Hackins Hey, Liverpool, Eng. Cloth, 1s. 6d.

This reform almanack is published for the benefit of fiscal reformers, free traders, speakers, writers, and the public generally. On its 315 pages will be found a treatise on the housing question, the national expenditure, the empire and armaments, tables of taxes and imposts, statistics of the empire, imports and exports, parliamentary and electrical statistics, a list of the members of the Houses of Commons and Lords and almost any matter that relates to Great Britain and her colonies. The book is published in a small edition very handy to carry in the pocket and will be found of great service in refreshing the mind when at a loss for figures to prove an assertion.

* * *

The Improvement of Towns and Cities, by Charles Mulford Robinson, is a volume devoted to the practical side of civic æsthetics. It tells how cities and towns may be made more attractive, beautiful and wholesome; and does this not in a theoretical way, but by pointing out the best that has been done anywhere along any line, telling exactly how it was done and by whom. Thus the volume is an invaluable handbook for city and town officials, and for improvement societies. It has received the highest praise from reviewers both in this country and in England. It has been officially endorsed by the American League for Civic Improvement, by the Architectural League of America, and by the officers of the American Park and Outdoor Art Association, the League of American Municipalities and the American Society of Municipal Improvements, besides innumerable local associations. It is a book that ought to be in the hands of every mayor, city engineer, park superintendent, and even every councilman, and that no improvement society should attempt to do without.

The volume (300 pages, 12mo., cloth) is published at $1.25 net, and $1.35 by mail. Subscriptions addressed to the author will be received at this office and promptly filled.

* * *

Philadelphia's Model Public Bath and Wash House. Social Science, New York, N. Y., October, 1901. Price per year, $1; 10 cents per copy.

Street Grades and Improvements. An article by Ernest McCullough, C. E., in *Midland Municipalities* for August, 1901, Marshalltown, Ia. Price, $1 per year; 10 cents a copy.

The Housing Problem. This is an account of the Glasgow Conference in the *Public Health Engineer.* There appears in this number also a paper on the *Protection of Buildings from Lightning,* read by Killingworth Hedges, M. Inst. C. E., in the Mechanical Science Section, British Association's Meeting, Glasgow, September, 1901. London, Eng., October 5, 1901. Price, 3d. per copy.

Keighley Corporation Electricity Works. A description of the municipal works of the town, illustrated with cuts and drawings. *The Electrical Engineer,* London, Eng., September 13, 1901. Price, 3d. per copy.

Public Health for September is an especially interesting number. E. W. Hope, Health Officer of Liverpool, Eng., writes on *Sterilization and Pasteurization vs. Tubercle-free Herds, Etc.* This is a paper read at the British Congress on Tuberculosis, discussing the safeguards against tuberculosis in the milk of cows. *The Measures Adopted by Different Nations for the Prevention of Consumption* is the subject of a long article by Prof. P. Brouardel on the efforts of the nations to stamp out this dread disease. *The Administration of the Manchester Milk Clauses, 1899,* by James Niven, Health Officer of the city, and *Tuberculosis and the Milk Supply,* by John A. W. Dollar, are two other papers that were read before the British Congress on Tuberculosis, 1901, London, Eng. Price per year, 10s.; per copy, 1s.

The Municipal World for October, 1901, has a good article on the *Ventilation of Sewers.* St. Thomas, Ont. Price, $1 per year; 10 cents per number.

The Good Roads Magazine for October, 1901, contains an instructive article by H. W. Perry, on *Economic Boulevard Work,* telling in

detail how a strip of road was laid on the western limit of Cleveland, O. New York, N. Y. Price, $1 per year; 10 cents the copy.

Acetylene in Germany forms the subject of the leading article by Dr. Frederick Rose, H. M., in the *Journal of Acetylene Gas Lighting*. This article contains some recommendations for the construction of generators. August-September, 1901. London, Eng. Price per year, 7s.; per copy, 6d.

Bradford's New Cold Stores. An interesting account of the unique municipal venture of this English town. *Municipal Tramways at Bournemouth.* A description of the first combined overhead and slot conduit system in England. *The Municipal Journal,* London, Eng., October 11, 1901. The issue of October 4 has an article on the *New Baths at St. Pancras.* This shows the novel features of this institution. Price per copy, 1 penny.

The October number of the *World's Work* is especially rich in municipal topics. *A Good Road, A Good Investment,* by Earl Mayo, contrasts the old-time bad roads with those of to-day that have been improved, showing the benefits that they bring to the country and city. *The Art of Saving Character* is an article by R. E. Phillips, telling of the work that is being done at the George Junior Republic to teach boys how to be better citizens and how much more success is secured here than in the other institutions in the country. W. Frank McClure writes of how *The Countryman Has the Better of It,* now that centralized schools, rural mail delivery, trolley lines and telephones have been introduced into the country districts. All the advantages of a city are combined with the health of the country air. Franklin Matthews contributes a paper on *The Character of the American Police,* citing present and recent examples in New York, Chicago, Philadelphia, Boston and St. Louis. New York, N. Y. Price, $3 per year; 25 cents per copy.

The Journal of the New England Water Works Association for September contains *Water Works Statistics for the Year 1900* as adopted by the New England Water Works Association, compiled by the editor. Dr. George W. Field, of the Massachusetts Institute of Technology, contributed a paper on *Eels in Water Works and Their Control.* Boston, Mass. Issued quarterly; price $3 per year, or $1 a copy.

The Hon. George L. Rives, president of the commission to revise the New York City charter, writes for the *North American Review* on the *Mayor and the Revised New York City Charter,* telling of the changes that will occur in the charter that goes into effect in January, 1902, and of the powers that the mayor of the greater city will have. *Financial Problems of a Great City* are discussed by the Hon. Bird S. Coler, Comptroller of the city of New York. The former police commissioner of New York, Hon. Frank Moss, in the *National Danger from Police Corruption,* points out how vice flourishes in New York unchecked by the police, and the part they take in assisting the criminals. *The Strength and Weakness of Tammany Hall* is the subject of Walter L. Hawley's contribution to this issue. Mr. Hawley shows up the various methods Tammany employs to keep together its supporters and what requirements are necessary to secure the Tammany nomination to any office. New York, N. Y., October, 1901. Price per year, $5; single number, 50 cents.

Value of Ethical Ideals in American Politics by the Hon. Wayne McVeagh, LL. D., ex-attorney general of the United States. This was an address delivered before the Society of Phi Beta Kappa, of Harvard University, June 27, 1901. Under the caption, The Trusts and the Single Tax, three papers have been contributed, dealing with different phases of the question. Louis F. Post, editor of the Chicago "Public," writes on *The Vital Element in Restraint of Trade.* Jackson H. Ralston presents an article on *The Evil of Exclusive Privileges. The Ultimate Basis of All Monopoly,* by Bolton Hall, is the third article in this series. *The Arena,* New York, N. Y., October, 1901. Price, $2.50 per annum; 25 cents a copy.

In the *Atlantic Monthly,* R. R. Bowker contributes *The Piracy of Public Franchises.* Mr. Bowker discusses separately the way in which the corporations in New York have obtained their franchises. *Small Voices of the Town,* by Charles M. Skinner, tells how the birds and animals in the parks of a city sing their songs or makes their calls. Even the wind, as it whistles down the stove-pipe, sings a tune that can be put into music. Boston, Mass. Price, $4 a year; 35 cents a copy.

The issue of October 3 of *The Independent* contains an interesting account of conditions of the poor in *The Housing of the Poor,* by Rev. G. L. McNutt, written from the author's personal experience from living as a laborer in tenements. *The Russian Police and Political Assassination,* by J. A. Hourwich, shows that the great power of the police has been unable to prevent assassination of rulers. New York, N. Y. Price, $2 per year; 10 cents per copy.

Albert Watkins writes on *The Outlook for Public Ownership* in *The Forum* for October, 1901. New York, N. Y. Price, $3 a year; 35 cents a copy.

The last of *The Century's* prize competitions for college graduates appears in the October number as *The Desperate Plight of New York City.* New York, N. Y. Price per year, $4; 35 cents a copy.

* * *

MUNICIPAL REPORTS

THE reports of the Mayor of the city of Hobart, Tasmania, for the years 1898, 1899, 1900, have been sent to us. The reports of the city officials of Canton, O., also have been received. The pages are lightened by numerous illustrations of schools, fire houses and bits of scenery in and about the parks and streets of the city.

The voluminous report of the department of public works of Rochester, N. Y., is one that would be a credit to any department. Maps, drawings and illustrations help to show what the department has been doing during the last year.

The second annual message of Samuel. H. Ashbridge, Mayor of Philadelphia, Pa., together with report of director of public works and the bureau of surveys, fills a volume of over 240 pages, with many cuts and drawings.

As usual the report of the commissioners of parks of the city of Detroit, Mich., for 1901, is a work of art. Beautiful photographs of the parks and boulevards are reproduced in colors to harmonize with the subjects that are intended to be shown. The typographical features are excellent and the paper used of the heavy, coated kind that lends a magnificent appearance to the whole. On interesting feature of the report is the addition of a list of the trees and shrubs that are native to the State of Michigan.

We have also received the sixth annual report of the Herkimer (N. Y.) Municipal Commission, and the thirteenth report of the Robert T. Swan, Commissioner of Public Records of the State of Massachusetts, on the custody and condition of the public records of parishes, towns and counties.

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MUNICIPAL BOND SALES FOR OCTOBER

No Bids for Los Angeles Bonds--Trouble for Fort Worth--A Red Letter Day for New York's Municipals--Bonds for St. Louis Fair--Alabama Convention Enacts Wise Laws

THE number of bonds sold during the last month will not amount to more than three-fourths the total of the sales during September, but the increased sales for the municipal bonds of that month was largely due to the fact that Massachusetts failed to sell her bonds in July and subsequently disposed of them in September. For the first three weeks in October the sales amounted to over eight millions of dollars.

For the first time in its history, New York city was able to dispose of its securities at a greatly advanced premium. There was an oversubscription for the issue of 3½ per cents, which sold at a premium of 7.271. The highest bid for the $3,600,000 issue was 107.271.

The city of Fort Worth, Tex., will soon be involved in a law suit because of unpaid interest due on its bonds. A committee of bondholders has been organized and as many unpaid coupons on Fort Worth's bonds as can be secured will be included in the demand on the city. No compromise will be offered the city and the fight will be to the death.

At the coming election the taxpayers of Lake County, Col., will have an opportunity to end a litigation that has continued for fifteen years over the county's defaulted bonds and warrants. The indebtedness, including the interest, is now $2,752,000, of which but $800,000 represent the original bonds. The bond holders propose that the county take the bonds by an issue of 4 per cent. bonds, payable in twenty years,

Owing to some complications there were no bids for the bonds of Los Angeles, Cal., and it will be necessary to readvertise them. Bids had been asked for an issue of $2,000,000 3 per cent., forty-year bonds of the city.

Just as soon as the municipality of St. Louis, Mo., shall have passed an ordinance providing for a levy of taxes for interest and sinking fund for the $5,000,000 World's Fair bonds to be issued by the city, the bonds will be prepared for sale. Although the bonds will bear but 3 per cent. interest, it is confidently expected that they will bring a premium of $400,000.

The Alabama constitutional convention has enacted laws which it is hoped will more thoroughly protect investors in the State. The local bond holders were instrumental in having the statutes passed and are much pleased with the results. Greater activity in the sale of municipal bonds in Alabama will no doubt follow this legistion.

PURCHASER.	PURCHASE.	INT. RATE.	TERM, YEARS.	AMOUNT.	PRICE.
Bolger, Thos. S., & Co., Chicago	Sardis, Miss., Water Works	4½ per cent.	5—20 Opt.	12,000	Par.
First National Bank, Cloquet	Moose Lake, Minn., Water Works Improvement	5 per cent. a.	10	2,000	Par.
Gardner Savings Bank	Gardner, Mass., School-house	3½ per cent. s. a.	1—10 Ser.	20,000	100.625
Greening, C. G., Local	Grand Meadow, Minn., Water Works	5 per cent. a.	12 1-6 Avg.	5,500	103.000
Kean, S. A., Chicago	Nampa, Ida., Sewer, Coupon	5 per cent.	10—20 Opt.	15,000	102.666
Local	Allentown, Pa., Improvement	3½ per cent. s. a.	5—30 Opt.	3,600	103.180
O'Connor & Kahler, New York	White Plains, N. Y., Water	3½ per cent. s. a.	30	86,000	100.125
O'Connor & Kahler, New York	White Plains, N. Y., Macadamizing	3½ per cent. s. a.	29	75,000	100.125
O'Connor & Kahler, New York	White Plains, N. Y., Sewer	3½ per cent. s. a.	29	10,000	100.125
Robertson, Andrew	Asbury Park, N. J., Library	4 per cent. s. a.	30	18,000	105.000
State Bank, Toledo	McClure, O., Water	5 per cent. s. a.	5—40 Opt.	18,000	102.250
Unknown	Prescott, Ont., Electric Light	4 per cent.		6,000	105.000
Yonkers Savings Bank	Yonkers, N. Y., Assessment	4 per cent.	1 1-3	37,000	100.490
Dickey, John W., Augusta	Dublin, Ga., School, Light and Water, Gold	5 per cent. s. a.	29	25,000	106.370
First National Bank, Local	Caldwell, Ida., Water Works	5 per cent. s. a.	10—20 Opt.	20,000	Par.
Irving Savings Bank	Yonkers, N. Y., School	4 per cent.	6 mos.	30,000	Par.
McCurdy, R., Local	Youngstown, O., Quarry Street, Grading	5 per cent. s. a.	1—5 Ser.	700	101.855
McCurdy, R., Local	Youngstown, O., Pearl Street, Guttering	5 per cent. s. a.	1—5 Ser.	650	101.846
Mackintosh, J. C., Local	Halifax, N. S., City	4 per cent.	6 Avg.	8,500	99.025
Mansfield Savings Bank	Plymouth, O., Water Works	5 per cent. s. a.	9—28 Ser.	20,000	112.920
Mechanics' Savings Bank, Fishkill Landing	Pleasantville, N. Y., Water Works	3½ per cent.	5—29 Ser.	25,000	101.292
National Life Insurance Co., Montpelier	College Hill, Pa., Electric Light	4.4 per cent. s. a.	9¼ Opt.-Avg.	10,500	Par.
Unknown	Lumpkin, Ga., Town	4 per cent. s. a.	10—30 Ser.	10,000	Par.
Braddock National Bank	Swissvale, Pa., Sewer, Coupon	4 per cent. s. a.	15½ Avg.	105,000	101.985
De Ridder, J. H., Cashier	Corinth, N. Y., Water Works, Coupon	3½ per cent. s. a.	5—26 Ser.	44,000	100.988
Farmers' & Merchants' Bank, Local	Greenville, Pa., Sewer	4 per cent. s. a.	1—10 Ser.	5,000	101.180
Farson, Leach & Co., Chicago	Woodmere, Mich., Water Main	3½ per cent. s. a.	30	93,000	100.254
First National Bank	Gilman, Ill., Paving	4 per cent. a.	1—9 Ser.	6,000	95.000
First National Bank, Local	St. Mary's, O., E. Spring Street, Improvement	4½ per cent. s. a.	1—10	13,000	100.769
German National Bank, Cincinnati	Cincinnati, O., Street Improvement	3½ per cent. s. a.	10	35,000	101.528
Hamilton, Naudain, Local	Harrisburg, Pa., Water	3 per cent. s. a.	30	75,000	100.013
International Trust Co., Local	Denver, Colo., Sub-dist. Improvement	6 per cent. s. a.	7 Opt.	10,000	101.170
Ulster County Savings Inst., Local	Kingston, N. Y., Sewer Notes	4 per cent.		1,234	Par.
Western Reserve National Bank, Local	Warren, O., West Franklin Street	4 per cent. s. a.	4.1 1-3 Avg.	3,500	101.000
Rollins, E. H., & Sons, Boston	Hyde Park, Mass., High School	4 per cent. s. a.	10¼ Avg.	60,000	105.896
Rollins, E. H., & Sons, Boston	Hyde Park, Mass., School	4 per cent. s. a.	8¾ Avg.	17,000	105.896
Seasongood & Mayer, Cincinnati	Bond Hill, O., Paddock Road Assessment	5½ per cent. a.	1—10 Ser.	26,662	101.000
Hahn, Geo. M., New York	Nyack, N. Y., Sewer	3½ per cent. s. a.	11¼ Avg.	8,000	100.530
Harris, N. W., & Co., Chicago	Walla Walla, Wash., School	4 per cent. s. a.	10	25,000	100.125
Day, R. L., & Co., New York	Cleveland, O., Market-house	4 per cent. s. a.	22	110,000	101.720
Day, R. L., & Co., Boston	Stamford, Conn., Sewerage	3½ per cent. s. a.	20	25,000	103.419
Denison, Prior & Co., Cleveland	Newport News, Va., Street Paving	4 per cent. s. a.	40	100,000	100.480
Rollins, E. H., & Sons, Boston	Pontiac, Mich., Union School	5 per cent. s. a.	10	50,000	109.000
Denison, Prior & Co., Cleveland	Youngstown, O., Boardman Street Paving	5 per cent. s. a.	2—6 Ser.	12,000	104.010
McCurdy, R., Youngstown	Youngstown, O., Paving	5 per cent. s. a.	2—6 Ser.	3,450	103.430
Dunscomb & Jennison, New York	Troy, N. Y., School	3½ per cent. s. a.	5 2-3 Avg.	52,266	100.620
First National Bank, Milford	Frederica, Del., School	4 per cent. s. a.		5,000	Par.
Farson, Leach & Co., New York Harris, N. W., & Co., New York	Allegheny, Pa., Various	3½ per cent. s. a.	16 Avg.	1,098,000	102.000
Unknown	Weyanwega, Wis., School	4 per cent. s. a.	8 1-3 Avg.	20,000	101.250
New First National Bank, Columbus	Galion, O., Street Assessment	4½ per cent. s. a.	4 5-6 Avg.	8,500	101,250
New First National Bank, Columbus	Galion, O., So. Liberty Street Improvement	4½ per cent. s. a.	5½ Avg.	4,800	101.401
County National Bank, Local	Clearfield, Pa., School	3½ per cent. s. a.	8—30 Opt.	20,000	Par.
Seasongood & Mayer, Cincinnati	Barberton, O., Tuscarawas Avenue Paving	5 per cent. s. a.	5 2-3 Avg.	10,500	100.810
Seasongood & Mayer, Cincinnati	Barberton, O., Storm Sewer	5 per cent. s. a.	5¼ Avg.	9,800	100.760
Seasongood & Mayer, Cincinnati	Barberton, O., Second Street Paving	5 per cent. s. a.	5 2-3 Avg.	8,200	100.520
Minnesota Loan & Trust Co., Minneapolis	Pipestone, Minn., Court House	5 per cent. s. a.	5—20 Opt.	20,000	104.125
Sinking Fund	Camden, N. J., Sewer	5 per cent.		10,700	Par.
Harvey, Hon. Edw., Local	Allentown, Pa., Improvement	3½ per cent. s. a.	5—30 Opt.	96,400	102.000
Jose, Parker & Co., Boston	Taunton, Mass., Water Main	3½ per cent. s. a.	97¼ Avg.	35,000	102.890
Harris, N. W., & Co., Chicago	Billings, Mont., City Hall	4½ per cent.	10—20 Opt.	32,000	102.578
White, Geo. C., Jr., New York	Yonkers, N. Y., Registered School	3½ per cent. s. a.	22 1-3 Avg.	13,000	103.669

COMPARATIVE BIDS FOR CONSTRUCTION WORK

CONDUIT

CLEVELAND, O.—Bids submitted for a conduit to divert Giddings Brook through Baldwin avenue, into Doan Brook:

	Excavation.	No. 1 shale brick.	Portland concrete.	Nat. concrete.	Rock-faced ashler.	Cast iron: Brick in manhole.	Cast iron: Catch basin.	Manhole.	Catch basin.	C. B. pipe, 12-in.	Spec. catch basin.	Lumber.
Clements Bros. Construction Co.	$.81	$8.00	$5.65	$4.00	$635.00	$7.50	$.03	$.03	$24.00	$.80	$40.00	$25.00
C. H. Fath & Son Construction Co.	.85	9.75	5.40	4.05	900.00	7.50	.05	.04	50.00	.40	100.00	30.00
A. F. Helm	.97	9.50	7.00	4.10	800.00	9.00	.05	.03	29.50	1.00	60.00	30.00
N. O. Pav. & Construction Co.	1.00	12.00	10.00	6.00	2,500.00	9.00	.04	.04	40.00	.75	50.00	30.00

ASPHALT PAVING

SALT LAKE CITY, UTAH.—Proposals for paving Second South and Third South streets were as follows:

	Grading. 13,000 cu. yds.	Curbing. 10,500 cu. yds.	Stone block. 11,500 sq.. yds.	Asphalt. 32,000 sq. yds.	Repairing. 3,000 sq. yds.	Resurfacing. 6,000 sq. yds.	Crosswalk. 2,000 sq. ft.	Concrete gutter. 1,000 lin. ft.
Alcatraz Asphalt Paving Co.	$ .45	$1.00	$2.70	$2.40	$1.35	$1.40	$ .45	$2.10
N. P. Glann Construction Co.	.50	1.25	3.29	3.00†	2.50	2.70	1.00	3.00
City Street Improvement Co.	.40	1.25	3.10	2.50*	2.25	2.20	.60	2.07

†Trinidad asphalt. *Santa Cruz Asphaltic Sandstone.

MARION, IA.—Asphalt bids were as follows for 5-in. concrete, binder 1-in., surface 1½-in.:

	Paving, per sq. yd.	Extra grading.	Per 100 ft. overhall.	Extra concrete.	Extra gravel.	Extra br. stone.	Extra sand.	Old curb reset.	Comb. curb Drain tile.	Comb. curb and gutter.	Gutter.
Barber Asphalt Co., Chicago	$1.90	$.25	$.01½	$5.00	$1.25	$1.50	$1.10	$.12	$.14	$.43	$.24
Western Paving & Supply Co., Chicago	1.59	.15	.03	4.50	1.50	1.65	1.25	.10	.10	.37	.17
R. F. Conway Co., Chicago	1.71	.30	.01	4.25	.80	1.25	1.00	.10	.10	.45	.20

SEWER

BOSTON, MASS.—The Metropolitan Water and Sewerage Board received the following bids for Section 58 of the High Level Sewer, Milton, Mass.:

	Earth excavation and refilling 127 in. x 139 in. sewer, 2,560 lin. ft.	Brick masonry, American, 1,000 cu. yds.	Brick masonry, Portland, 2,800 cu. yds.	Concrete masonry, American, 1,000 cu. yds.	Concrete masonry, Portland, 2,300 cu. yds.	Spruce lumber in trench in place, 10 M. ft. B. M.	Total.
National Cont'g Co., 11 Broadway, New York	$19.00 48,640.00	$14.00 14,000.00	$14.00 39,200.00	$4.75 4,750.00	$5.30 12,190.00	$25.00 250.00	$119,030.00
Jones & Meehan, 1 Beacon St., Boston	15.00 38,400.00	14.00 14,000.00	15.00 42,000.00	5.00 5,000.00	6.50 14,950.00	40.00 400.00	114,750.00
H. P. Nawn, Boston	15.00 38,400.00	12.00 12,000.00	13.00 36,400.00	5.00 5,000.00	6.50 14,950.00	30.00 300.00	107,050.00
Metropolitan Cont'g Co., 95 Milk St., Boston	11.40 29,184.00	12.75 12,750.00	13.75 38,500.00	4.85 4,850.00	5.65 12,955.00	35.00 350.00	98,629.00
E. W. Everson & Co., Providence	11.00 28,160.00	12.00 12,000.00	14.00 39,200.00	4.50 4,500.00	6.00 13,800.00	30.00 300.00	97,960.00
Latta & Terry Co., 1001 Chestnut St., Philadelphia	6.70 17,152.00	12.45 12,450.00	12.90 36,120.00	4.15 4,150.00	4.75 10,295.00	30.00 300.00	81,097.00

PAVING

CANTON, O.—The following bids were received for paving on Second street:

	Jos. George.	Geo. B. Herring & Son.	W. S. Hadley.	Wise & McCafferty.	Harry Corl.	Melbourne & Dine.	Gen. Const. Co.	T. K. Turnbull & Son.
Sandstone curb:								
3,400 ft. straight	$1,190.00	$1,190.00	$1,326.00	$1,292.00	$1,190.00	.....	$1,394.00	$1,360.00
180 ft. circle	82.80	81.00	104.40	90.00	90.00	.....	90.00	90.00
100 ft. abutment	37.00	35.00	36.00	35.00	35.00	.....	90.00	50.00
Curb redressed and reset:								
100 ft. circle	15.00	8.00	20.00	15.00	20.00	$7.00	10.00	8.00
1,700 ft. old	306.00	119.00	272.00	170.00	255.00	161.50	170.00	306.00
Paving, 6,000 sq. yds.	6,000.00	6,060.00	6,480.00	6,300.00	5,880.00	5,370.00	6,300.00	5,700.00
Catchbasins, 2	24.00	50.00	30.00	.....	22.00	30.00	50.00	100.00
Drain:								
200 ft. 18-in.	140.00	112.00	140.00	80.00	82.00	120.00	140.00	120.00
40 ft. 12-in.	19.60	14.80	24.00	12.00	10.80	14.00	24.00	16.00
Manhole, 1	12.00	25.00	16.00	18.00	12.00	10.00	30.00	20.00
Manhole irons reset, 8	4.00	8.00	16.00	.....	12.00	16.00	12.00	.....
Berea curb:								
Straight, 3,400 ft.	1,598.00	1,496.00	1,462.00	1,530.00	1,496.00	1,615.00	1,530.00	1,530.00
Circle, 180 ft.	111.60	108.00	117.00	108.00	135.00	105.30	117.00	108.00
Abutment, 100 ft.	49.00	42.00	40.00	45.00	38.00	43.50	30.00	60.00
Total with Berea curb	8,279.00	8,043.00	8,617.00	8,278.00	7,963.00	7,492.00	8,413.00	7,968.00
Total with sandstone curb	7,830.00	7,703.00	8,464.00	8,012.00	7,609.00	.....	8,250.00	7,770.00

SEWER

BOSTON, MASS.—The following bids were received by the Metropolitan Water and Sewerage Board for Section 50 of the High Level Sewer in Quincy, Mass.:

	Earth excavation and refilling in trench and embankment, 135 in. x 150 in. sewer. 3,070 lin. ft.	Brick masonry, American, in trench and embankment, 500 cu. yds.	Brick masonry, Portland, in trench and embankment, 3,500 cu. yds.	Concrete masonry, American, in trench and embankment, 1,000 cu. yds.	Concrete masonry, Portland, in trench and embankment, 4,500 cu. yds.	Boulder concrete masonry, Portland in trench and embankment, 400 cu. yds.	Spruce lumber in trench in place, 10 M. Ft. B. M.	Total.
Met. Cont'g Co., Boston, Mass.	$12.75 39,142.50	$12.70 6,350.00	$13.70 47,950.00	$4.75 4,750.00	$5.45 24,525.00	$5.00 2,000.00	$35.00 350.00	$125,067.50
National Cont'g Co., New York, N. Y.	13.20 40,524.00	13.45 6,725.00	13.45 47,075.00	4.55 4,550.00	5.10 22,950.00	4.80 1,920.00	24.00 240.00	123,984.00
Beckwith & Quackenbush, Herkimer, N. Y.	11.80 36,226.00	11.80 5,900.00	12.80 44,800.00	4.50 4,500.00	5.50 24,750.00	3.15 1,260.00	35.00 350.00	117,786.00
H. P. Nawn, Boston, Mass.	9.00 27,630.00	12.50 6,250.00	13.50 47,250.00	4.00 4,000.00	6.00 27,000.00	5.00 2,000.00	30.00 300.00	114,430.00
Geo. Phillips, Boston, Mass.	10.00 30,700.00	11.50 5,750.00	12.50 43,750.00	4.50 4,500.00	5.00 22,500.00	3.50 1,400.00	25.00 250.00	108.850.00
Latta & Terry Co., Philadelphia, Pa.	8.10 24,867.00	12.50 6,250.00	13.00 45,500.00	4.10 4,100.00	4.65 20,925.00	4.00 1,600.00	30.00 300.00	103,542.00
J. W. Bustin & Co., Syracuse, N. Y.	7.85 24,099.50	11.65 5,825.00	12.75 44,625.00	4.00 4,000.00	4.50 20,250.00	3.85 1,540.00	20.00 200.00	100,539.50
C. G. Belden & Co., Quincy, Mass.	7.34 22,533.80	10.67 5,335.00	11.47 40,145.00	3.52 3,520.00	4.63 20,835.00	3.75 1,500.00	30.00 300.00	94,168.80

GAS STATISTICS IN AMERICAN CITIES

Including Those Having a Population of From 5,000 to 50,000 Given in Order of Population

City.	Population of city.	Population of district supplied.	Annual output in million cu. ft.	Number of meters.	Price. Light. Gross.	Light. Net.	Fuel. Gross.	Fuel. Net.	Candlepower.	Per cent. sold for fuel.	Number public lamps.	Price per year.	Hours per year lighted.
Pottstown, Pa.	13,096	15,000	9	625	$1.50		$1.25		24				
Plymouth, Pa.	13,649	13,500	6	400	1.50		1.50		24				
Raleigh, N. C.	13,643	15,000	14	524	2.00	$1.50	2.00	$1.50	22		100	* $18.00	
Marlboro, Mass.	13,609	14,000	8	437	2.50	1.75	2.50	1.50	18	45			
Kankakee, Ill.	13,595	15,000	12	424	1.50	1.25	1.50	1.25	18	12			
Hagerstown, Md.	13,591	10,000	24	1,200	1.80	1.50	1.80	1.25	24	40			
Carbondale, Pa.	13,536	15,000	8		1.80		1.80						
Marietta, O.	13,348	12,000	10	500	1.70	1.40	1.00		24				
Freeport, Ill.	13,258	15,000	32	1,234	1.35	1.25	1.35	1.25	18	50	30	* 19.50	† 10 P. M.
Owensboro, Ky.	13,189	15,000	15	850	1.60	1.50 to 1.25	1.00 to .75		18	33			
Janesville, Wis.	13,185	15,000	28	1,663	2.00	1.60 to 1.25	2.00	1.60 to 1.25	25	30			
Ithaca, N. Y.	13,136	12,000	11		2.00	1.90	1.25	1.19	18	10	35		
Flint, Mich.	13,103	14,000	17	700	1.70	1.25 to 1.50	1.00		22	45			
Ashland, Wis.	13,074	13,000	9	310	2.00	1.80	2 00	1.50	22	25	110	* 24.00	2,200
Mahanoy City, Pa.	13,054	13,800	3	235	2 75	2.47	1.75	1.75	24	8			
Chillicothe, O.	12,976	13,000	10		1.50	1.25	1.25	1.00	18—20	10			
Ashtabula, O.	12,949	13,000	19	900	1.10	1.00	1.10	.75	18	50			
Menominee, Mich.	12,818	13,000		y 200	1.70	1.50	1.20	1.00					
Hannibal, Mo.	12,780	15,000	10	484	2.00	1.80	2.00	1.50	18	15			
Ogdensburg, N. Y.	12,633	14,000	7	481	3.00	2.00	1.50		18—20	6			
Glen Falls, N. Y.	12,613	12,600	18	675	2.00	1.80	1.50	.30	18	30			
Waterloo, Ia.	12,580	12,580			1.50	1.35	1.50	1.35					
Cairo, Ill.	12,566	12,000			2.00		1.50				254	* 15.00	†
Pittston, Pa.	12,556	15,000	15	550	1 50	1.35	1.35		28	2			
Fresno, Cal.	12,470	15,000	18	1,000		2.00		2.00	20	50			
Saratoga Springs, N. Y.	12,409	12,000	25	900	2.25	2.00		1.50	28	10	207	* 28.00	4,000
Hammond, Ind.	12,376	17,000	¼		1.10	1.00	1.10	1.00	16				
Wausau, Wis.	12,354	12,000	8	335	2.00		1.50		18	10			
Stillwater, Minn.	12,318	12,300	8	350	1.90	1.80	1.30		22				
Columbia, Pa.	12,316	12,300	5	560	2.50	2.00	1.75	1 40	22	5			
Pequa, O.	12,172	12,000	10	495	1.50				22				
Massillon, O.	11,944	13,000	10	507	1.50	1.25	1.25		19.5		2	* 37.50	4,000
Huntington, W. Va.	11,923	18,000	8	400	1.50	.75	¶ .20		18	12			
Hornellsville, N. Y.	11,918	15,000	400	1,500	.30	.27	.30	.27	12	99			
Ironton, O.	11,868	12,000	14	500	1.00	.90	1.00	.90	20	10			
Marion, O.	11,862	13,000	15	500	1.50	1.50	1.50	1.30	18	5			
Greenville, S. C.	11,860	4,500	7	404	2.00	1.75	1.70	1.45	24	15			
Denison, Tex.	11,807	12,000	1	550	2.50		2.00		17	40			
Alpena, Mich.	11,802	13,000	5	330	2.00	1.50	1.00		18	17	20		3,760
Parkersburg, W. Va.	11,703	20,000	9	y 300	1.40	1.25			18				
Dunkirk, N. Y.	11,616	13,000	27	680	1.25	1.00 to 1.25	1.00		19	26			
Kenosha, Wis.	11,606	12,000	25	969	1.70	1.50	1.20	1.00	23	52			
Fort Smith, Ark.	11,587	10,000	12	750	2.00	2.00	1.50	1.50	16	20			
Marshalltown, Ia.	11,544	12,000	11	500	2.00	2.00 to 1.70	1.60	1 40	18	50			
Rutland, Vt.	11,499	12,000			2.25	1.80	2.25	1.80	24				
Pine Bluff, Ark.	11,496	3,000	6	215	2.50	2.00	2.50	1.50	20	25			
Baton Rouge, La.	11,269	15,000	6	300	3.00	2.00	1.25		18	5			
Morristown, N. J.	11,267	11,500	25	940	1.75	1.65	1.50		20	15	177	* 21.00	All n't.
Charleston, W. Va.	11,099	12,000	7	350	1.60 to 1.40	1.44 to 1.26	1.75	1.58	16	1			
Corning, N. Y.	11,061	11,061	22	550	1.50	1.50	1.50	1.50	20	10			
Tiffin, O.	10,989	12,000	8	400	1.00	1.00	1.00	1.00	22	5			
Lawrence, Kan.	10,862	12,000	17	965	1.75	1.60	1.75	1.60	18	50	122	* 18.00	2,200
Jeffersonville, Ind.	10,774	10,000	14	510	1.50	1.35	.85	.77	18	20			
Helena, Mont.	10,770	12,000	20	771	2.50	2.00	2.25	1.87	17.5	20			
Portsmouth, N. H.	10,637	10,600	11	934	1.67	1.50	1.67	1.50	18	1			
Kokomo, Ind.	10,607	12,000	4	350	1.00	.90			18				
Mankato, Minn.	10,599	10,000	12	800	1.75	1.65			23	40			
Ottawa, Ill.	10,588	14,000	19	750	1.50		1 25		18				
Millville, N. J.	10,583	10,200	7	350	1.50	1.35		1.35	18	7			
Bath, Me.	10,477	5,000	8	400	2.10	2.00	1.60	1.50	17.5	10			
La Salle, Ill.	10,446	20,000	13	770	1.75	1.50	1.60	1.35	18	30			
Beloit, Wis.	10,436	10,436	9	375	1.70	1.40	1.70	1.40	18	40			
Geneva, N. Y.	10,433	10,400	17	800	1.60	1.50	1.60	1.50	18	30			
Peekskill, N. Y.	10,358	10,300	10	500	1.60	1.50	1.60	1.50	22	5			
Fort Scott, Kan.	10,322	10,000	16	650	1.50			1.00	17.5	40			
Meadville, Pa.	10,291	10,000	8	400	1.00	.90	¶		20				
Henderson, Ky.	10.272	15,000	15	700	1,00		1.00		18	1			
Sioux Falls, S. D.	10,266	12,000	17	1,185	2.00	2.00	1.75	1.75	23	50	103	* 24.00	†
Vincennes, Ind.	10,249	12,000	18	700		.95		.95	19	15			
Sherman, Tex.	10,243	13,000	10	478	2.50	2.00	2.00	1.50	17	30			
Johnstown, N. Y.	10,130	28,500	55	4,464	1.70	1.60	1.50	1.50	23	35	2	* 28.00	4,000
Marquette, Mich.	10,058	10,000	10	500	2.00	1.60 to 1.80	2.00	1.60 to 1.80	20	10			
Beaver Falls, Pa.	10,054	15,000	8	400	1.50	1.28	1.00	1.00	20				
Phillipsburg, N. J.	10,052	10,035	6	y 210					17				
Walla Walla, Wash.	10,049	10,000	6	375	3.50	3.15		2.00	18	15			
Greensboro, N. C.	10,035	6,000	10	425	2.50	2.00		1.00	18	12			
Winston, N. C.	10,008	20,000	4	125	1.50	1.50	1.25	1.25	18				
Hot Springs, Ark.	9,973	12,000	12		3.00	3.00	2.00	2.00	24		36	* 27.00	
Bellaire, O.	9,912	10,000	10	600	1.30	1.20			16				
Pontiac, Mich.	9,769	10,000	16	850	1.75	1.50		1.50 to 1.25	24	60			
Anniston, Ala.	9,695	12,000	12	475	2.00	1.80	2.00	1.25	17	20			
Adrian, Mich.	9,654	9,640	13	1,015	1.80	1.62	1.80	1.62	20	40			
Jefferson City, Mo.	9,664	8,000	7	380	2.00	1.80 to 1.90	1.50		22	5			
Carlisle, Pa.	9,626	10,000	6	470	1.50	.95	1.50	.95	22				
Mattoon, Ill.	9,622	9,500	8	475	2.00	1.50	2.00	1.50	22	30			
Middletown, Conn.	9,589	17,000	20	879	1.60	1.50	1.40	1.40	22	15			
Fargo, N. D.	9,589	15,000	10	750	2.50	2.00	2.00	1.60	18	60			
Escanoba, Mich.	9,549	10,500	1	175	1.50		.75	.60	20	20			
Stevens Point, Wis.	9,524	10,000	4		2.00	1.75	1.50	1.25	20	33			
West Chester, Pa.	9,524	10,000	18	1,450	1.60	1.50	1.10	1.00	24	50			
Frankfort, Ky.	9,487	9,847	12	675	2.20	2.00	1.20	1.00	22	10			
Hackensack, N. J.	9,443	60,000	150	6,000	1.50	1.35	1.50	1.35	24	30	175	* 18.00	4,000
Clarksville, Tenn.	9,431	10,000	8	250	2.00		1.50		17	20			
Waukegan, Ill.	9,426	18,000	20	600	1.25	1.15	1.25	1.00	20	60			
Carthage, Mo.	9,416	10,000	10	450	2.00		1.50		18	25			
Port Jervis, N. Y.	9,385	10,000	8	500	2.10 to 1.60	2.00 to 1.50	1.50		22	12	2	20.00	4,000
Hutchinson, Kan.	9,379	10,000	6	250	2.00		1.50		23	33			
Paris, Tex.	9,358	15,000	3	y 250	2.50		1.50		16	22			
Frederick, Md.	9,296	9,000	6	450	1.80		1.50		20	10			
Fort Madison, Ia.	9,278	10,000	9	375	1.85	1.50		1.00	20	50	117	* 20.00	All n't.

* Includes repairs. † Lighted by moon scale. y Number of consumers. ¶ Natural. (From Brown's Directory of American Gas Companies. By courtesy of the publisher.)

(Concluded in December.)

RECENT INVENTIONS

FOREIGN.

9,152—*Manholes.* W. E. Evans, London.
9,285—*Water Meters.* W. Germutz, Vienna, Austria.
9,601—*Fireproof Buildings and Structures.* W. Seefels and O. Soldan, London.
10,649—*Ventilating Sewers.* J. Madden, Staffordshire, Eng.
10,688—*Telephone Fire-Alarm.* L. deL. Wells, London.
10,714—*Drain Pipes, etc.* D. Read, Harlesden, Middlesex, Eng.
10,921—*Sewage, etc.* C. Lehmann and F. Neumeyer, Zurich, Switzerland.
681,579—*Apparatus for Treating Sewage.* Robert H. Reeves, London, Eng.

AMERICAN

681,700—*Fireproof Construction and Method of Making Same.* Abraham L. A. Himmelwright, New York, N. Y., assignor to the New Jersey Wire Cloth Company, Trenton, N. J.
681,728—*Fireproof Construction and Method of Making Same.* William Orr, Trenton, N. J., assignor to the New Jersey Wire Cloth Company, Trenton, N. J.
681,802—*Voting-Machine.* Lawrence W. Snellen, Olathe, Kan.
681,834—*Brick or Block Pavement.* Cyrus K. Porter, Buffalo, N. Y.
681,870—*Fireproof Floor Construction.* Charles F. Buente, Allegheny, Pa.
681,969—*Fireproof Floor and Ceiling.* John O'Neil, New York, N. Y.
682,005—*Mail-Box.* William H. Walker, Degraff, O., assignor of three-fifths to S. E. Loffer and W. E. Harris, same place.
682,069—*Fire-Extinguisher.* Thomas F. Handly, Allegheny, Pa.
682,082—*Fire-Escape.* Charles A. Ives, New York, N. Y.
682,156—*Dust-Trap for Street-Sweepers.* Augustus A. Clough, Denver, Col.
682,162—*Valve for Water-Gages.* William A. Bailey and Alfred J. Bailey, Salford, Eng.
682,274—*Fireproof Partition for Buildings.* Samuel E. Rabbitt, Washington, D. C.
682,280—*Broom for Street Sweeping.* Andrew Schaefer, Louisville, Ky.
682,312—*Building Construction.* Julio G. Zwicker, Mexico, Mexico.
682,316—*Stud for Building Construction.* William L. Caldwell, New York, N. Y.
682,434—*Fireproof Covering.* Maurice Sullivan, New York, N. Y.
682,462—*Floor or Sidewalk.* Richard Fleming, Corning, Ohio.
682,471—*Automatic Smoke-Preventer.* Phineas F. King, Cleveland, O.
682,477—*Smoke-Consumer.* William A. Martel, Brandon, Canada.
682,480—*Apparatus for Filling or Emptying Reservoirs Automatically.* Jean L. A. Meyssonnier, Privas, France.
682,683—*Fireproof Flooring.* Chas. F. Haglin, Minneapolis, Minn.
682,834—*Dumping-Wagon.* William O. Shadbolt, Brooklyn, N. Y.
682,869—*Fire-Escape.* Richard Hammerly. New York, N. Y.
682,964—*Fire-Extinguisher.* George A. Swenson, Brooklyn, N. Y.
683,081—*Cement-Walk-Construction Frame.* Cornelius J. Sullivan, Syracuse, N. Y.
683,195 *Fire-proof Partition.* Andrew G. Beam, New York, N.Y.
683,337—*Process of Making Artificial Sandstone.* Walter Schulthess, Zurich, Switzerland.
683,413—*Street-Sweeper.* Andrew J. Reynolds, Boston, Mass.
683,426—*Fireproof Construction.* Charles A. Balph, Pittsburg, Pa.
683,507—*Apparatus for Removing Snow.* Reuben Shirreffs, Boston, Mass.
683,627—*Bridge.* Frederick G. Vent, Chicago, Ill.
683,649—*Excavator.* George W. King, Marion, O.
683,719—*Car-Fender.* Edmund Amrein, St. Louis, Mo.
683,798—*Fireproof Partition.* Albert S. Reavis, Washington, D. C.
683,799—*Fireproof Structure.* Albert S. Reavis, Washington, D. C.
683,945—*Draining Device for Hydrants.* Michael T. Kennedy, New York, N. Y.
684,004—*Mail-Box.* William G. Stephenson and Fred H. Hood, Morenci, Mich.
684,051—*Apparatus for Treating and Removing Snow.* F. W. Farquhar and H. S. Farquhar, New York, N. Y.
684,052—*Apparatus for Removing Snow from Thoroughfares.* H. S. Farquhar, San Francisco, Cal.
684,164—*Asphalt Pavement.* Joseph H. Amies, Philadelphia, Pa.
684,444—*Smoke-Consumer.* William W. Lowe, Early, Ia.
684,462—*Detachable Supporting Device for Hose Pipes or Nozzles.* Walter C. Sargeant, Melrose, and John J. Barker, Arlington Heights, Mass.
684,520—*Aerial Ladder.* Edward E. Nolan, Grand Rapids, Mich.

AMONG THE MUNICIPAL WORKERS

The People Who Make the Modern City Possible—Information of Importance to City Officials and Others

EXHIBITS AT WATER WORKS CONVENTION

THE exhibitors at the convention of the Central Water Works Association held at Evansville, Ind., on October 1-3, were many and presented interesting displays.

The Pittsburg Meter Company showed the Keystone water meter and other meters. The former is very simple, accurate and enduring.

The H. Mueller Manufacturing Company, of Decatur, Ill., had its usually large amount of things to show.

The Thompson Meter Company, of Brooklyn, N. Y., had a fairly large exhibit.

The Heine-Woerner multiple valve, made in Evansville, Ind., had much interest for the visitors.

Samples of tin and lead-lined iron pipes were shown by Lamb & Ritchie, of Cambridgeport, Mass.

The Worthington special oil meter, manufactured by H. R. Worthington, of New York, was exhibited. The principle is the same as that employed in the water meter of the same manufacture, but the meter is used to measure very small quantities of crude and other oils.

Other exhibitors were: National Meter Company, of Chicago; Sunday Creek Coal Company, of Columbus, O.; Dearborn Drug and Chemical Company, of Chicago; Keasbey & Mattison Company, of Ambler, Pa.

The exhibitors, by their presence, interest and assistance contributed largely to the success of this convention. Everybody was well pleased with the work of the convention and, while this was a most successful meeting, a better time is anticipated next year.

EXHIBITS AT STATE FIREMEN'S CONVENTION

AMONG the principal pieces of apparatus exhibited at the convention of the Massachusetts State Firemen's Association, held in Holyoke, Mass., September 25-27, were the Newcomb water tower, invented by Commissioner Newcomb, of Holyoke; the Eastman nozzles and the Baker cellar pipe. The nozzle that can be placed through a small hole in the flooring and played on the floor beneath attracted considerable attention. The Combination Ladder Company, of Providence, R. I., had a most extensive exhibition of fire apparatus. Neptune holders and deluge sets, Baker cellar pipes, Holloway chemical tank, Decarrie shut-off nozzles, ladders, waxed hose, etc., were among the many pieces of fire apparatus.

A. H. Finley & Co., of Lynn, Mass., exhibited their quick-hitch clothing. The suit is waterproof, the trousers being made of canvas, felt lined and with an oilcloth interlining and corduroy collar.

Kennedy & Sullivan Manufacturing Company, of Holyoke, Mass., showed a new hydrant in which the water hammer is eliminated.

T. E. McCarthy, of Holyoke, Mass., exhibited his ladder lock, a device for locking the ladders to the truck with one pull on a wire.

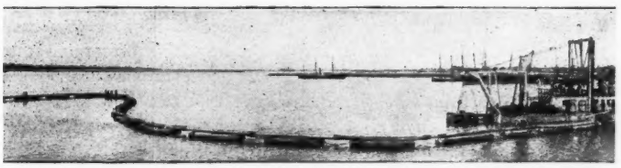
The Folding Ladder Brace Company, of Quincy, Mass., showed their ladder.

Samuel Eastman & Co. showed their deluge sets, steam shut-off nozzle and other implements.

Flynn & Kirby, Springfield, Mass., Muskegon chemical tank with hose reel attachment; C. Callahan & Co., C. N. Perkins & Co., Boston Woven Hose and Rubber Company, Gamewell Fire Alarm Telegraph Company were among the other exhibitors.

SCIENTIFIC DREDGING

In the harbors of the United States and along the course of some of the larger rivers it has been necessary to deepen the waterways for facilitating the incoming and outgoing traffic of the world. Antiquated methods for performing this work have long since been abandoned and the later and more scientific methods have been put in practice. Owing to the difficulty involved and the large amount of capital necessary for carrying on the work, it has devolved upon one firm, practically, to perform this arduous service, not only for the government of the United States, but also for cities, private individuals and others who have had dredging problems to be solved. The Atlantic, Gulf and Pacific Company, of the Park Row Building,



New York city, is the firm which has performed the most of this work.

This concern brings into use the most effective kind of machinery, and that which will achieve the most in the shortest period of time. The accompanying illustration gives a view of Oakland Harbor, California, showing the installation of an outfit of this company. This was a contract undertaken for the United States Government for the improvement of this harbor. The material was taken from the bottom of the harbor and discharged through the long line of pipes sustained by floats seen in the illustration, on to the land more than a mile away. To be exact the pipe line was 5,700 feet long.

The working of this hydraulic dredge is really wonderful. It will dig and put ashore any kind of material, hard rock excepted. It is admirably adapted for the deepening of harbors or water courses, and depositing the material for filling in and raising adjacent low and marsh land. The number of cubic yards which have been brought up from the depths of some harbor or water course by the numerous plants of this concern in different parts of the country in the last decade, would aggregate many millions.

A NEW LIFT BRIDGE FOR CLEVELAND

The Cleveland, Cincinnati, Chicago and St. Louis Railway Company several days ago placed into service their new double-track Scherzer Rolling Lift Bridge across the Cuyahoga River at Cleveland, Ohio. This bridge was designed by The Scherzer Rolling Life Bridge Company, Chicago, and replaced a double-track swing bridge which was obstructive to navigation, and also frequently placed the very heavy passenger traffic crossing it at a serious disadvantage. The bridge is used by the main lines of the C., C., C. & St. L., L. S. & M. S., Erie and other railroads, and is the principal railroad bridge crossing the Cuyahoga River at Cleveland.

The first Scherzer Rolling Lift Bridge constructed several years ago for the C., C., C. & St. L. Railway, across the Cuyahoga River at Cleveland, proved so satisfactory in every respect that the progressive management of the railroad company determined to remove the obstructive swing bridge at this much more important crossing and substitute a Scherzer Rolling Lift Bridge.

Railroad traffic was constantly maintained upon the swing bridge during the construction and erection of the Scherzer Rolling Lift Bridge. Vessel traffic in the river was also maintained, as the new bridge was erected in the upright position, on the piers which support the bridge when completed, the trains being operated through the new bridge during erection. Upon the completion of the new bridge, the center of the old bridge was removed; the new bridge was immediately closed into service, and within fifteen minutes, five passenger trains crossed the river on the new Scherzer Rolling Lift Bridge. The new bridge has since been in successful operation and the railroad service has been greatly improved.

The entire work of preparing the designs and plans and the construction of the bridge, together with the removal of the old swing bridge, was under the immediate charge and supervision of Mr. George W. Kittredge, Chief Engineer of the C., C., C. & St. L. Railway. The Scherzer Rolling Lift Bridge Company furnished the plans and specifications and checked the shop plans for the superstructure of the new bridge, and also furnished a consulting supervision over the erection of the bridge until completion. The plans for the substructure were prepared by the railroad company.

SHENANDOAH WINS WITH A SEAGRAVE

The Rescue Hook and Ladder Company of Shenandoah, Pa., went, saw, was seen and conquered at the firemen's big parade in Philadelphia recently. The company took the second prize awarded for the finest looking hook and ladder truck in line and in service.

The Columbia and the Phœnix companies also had delegations in line. Applause greeted the Shenandoah boys all along North Broad street to City Hall, where the firemen were reviewed by Mayor Ashbridge.

The Rescue boys are proud of the honor conferred, not because of the value of the prize, $15, but on account of it being the largest parade of firemen ever held in the State. Eight thousand men were in line. Delegations were present from Trenton, N. J., New York and other outside places.

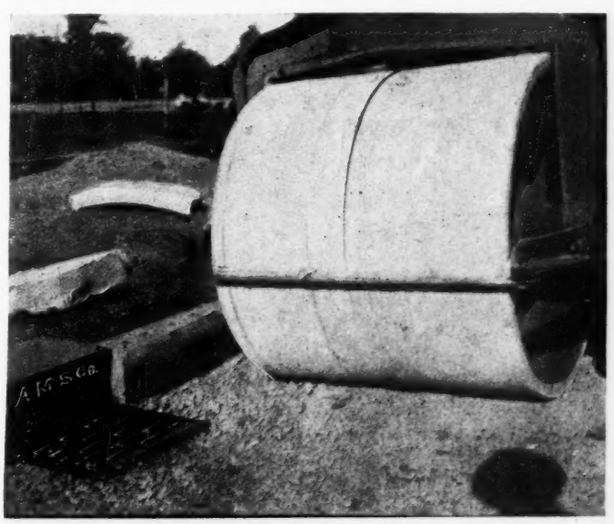
Thirty-seven men were with the Rescue Company, with Foreman William Emanuel in charge. Marshall Hughes handled the ribbons and Calvin Heckman, the seven-year-old son of Morris Heckman, perched high on the nobby Seagreave truck, made by the Seagreave Co., Columbus, O., proved a mascot. He was also the color bearer.

The result is not only creditable to the company, but also to the fire apparatus committee of Council which purchased the truck.

THE CATCH BASIN STOOD THE TEST

For some months past the city of Cleveland has been building a beautiful driveway in the suburbs, known as the Clifton Road. It has been constructed in the most thorough manner, and owing to the heavy grade at different points it was found necessary to install a good draining system in which was used the "Standard" catch basin, made by the American Municipal Supply Company of that city.

During the operation of rolling the new road, it became necessary to push the work with all possible speed, so the roller was kept going night and day. One night the operator of the roller, who probably became sleepy, allowed this ponderous twenty-two-ton roller



to climb the curb. It so happened that it was just where one of these "Standard" catch basins had been installed, as shown in the accompanying illustration, and through some inexplicable cause the machine was stopped just as the front rolls were directly over and rested upon the catch basin. The roller could neither be moved forward nor backward, so it rested upon the basin until morning, when the combined efforts of several men and jack screws were required to get the unruly machine back in the road. It was discovered on examining the catch basin that it had not been injured in the slightest, hardly a scratch being visible. It speaks well for the merit of the "Standard."

THE AMERICAN STREET RAILWAY ASSOCIATION

Twentieth Session—Second Visit to New York—Finest Exhibit of Street Railway Appliances Ever Assembled—Detroit Next Meeting Place—Officers Elected for Ensuing Year—Special Excursion to Bethlehem Steel Plant

THE American Street Railway Association recently held its twentieth annual session in Madison Square Garden, New York City. It is the second time that the association has enjoyed the hospitality of the Metropolis. Its first visit to this city was seventeen years ago. The session just closed was a decided contrast to that of the first New York meeting. During the seventeen-year interval the improvements in the street railway world have been many and varied. The inventive genius of America has turned out innumerable appliances for the betterment of rapid transit systems. But the progress in this field is almost unknown to the general public. While people generally appreciate the advancement that has been made in the rapid transit facilities, because of the multiplied conveniences, yet they seldom stop to think of the vast amount of work that is involved in the construction and equipment and administration of a well organizd street railway system. Much less do they give a thought to the sources of supply which make these well equipped systems possible. Hundreds of factories and mills with thousands of employes are kept busy the year round supplying demands for rapid transit in American cities.

AN IMMENSE EXHIBIT

To a person who had the appreciative knowledge of these facts, therefore, it was no surprise to enter Madison Square Garden during its recent occupancy by the American Street Railway Association and take in the lively scene; to the uninitiated it was an eyeopener. The entire floor space of that large amphitheatre was occupied by the exhibits of the street railway manufacturers. From its opening session to its close, it was thronged with delegates and spectators. Their contrivance was examined by the multitude and studied by those more deeply interested.

In addition to the exhibits there were presented for the consideration of the delegates many valuable papers both by the association itself and the accountants' branch. Previous to this session the usual practice has been followed in reading all of the papers on the programme, thus consuming hours of valuable time, which could be better employed. But at this meeting the innovation of printing the papers in advance and sending proofs to all of the delegates who were to be present so that they could have an opportunity to read them before the session. For this reason they were able to devote most of the time to the discussion of the papers and it was found on trial to yield much better and more satisfactory results to all concerned. It is a practice which other large conventions might find to their advantage to adopt.

NEXT CONVENTION AT DETROIT

The city of Detroit was selected as the next place of meeting. The following officers were elected for the ensuing year: H. H. Vreeland, New York, president; C. W. Wason, Cleveland, first vice-president; E. C. Foster, Boston, second vice-president; H. M. Sloan, Chicago, third vice-president; T. C. Penington, Chicago, secretary and treasurer. Executive committee: Walton H. Holmes, Kansas City; John A. Rigg, Reading; D. B. Dyer, Augusta; T. J. Nicholl, Rochester; G. W. Dickinson, Seattle.

One of the special features of this convention was a trip by special train, provided by the Bethlehem Steel Company, to its works at South Bethlehem, Pa. This was enjoyed by several hundred members of the association and some invited guests. Every provision imaginable was made to insure the enjoyment and comfort of the guests. After arriving at South Bethlehem the inspection of the immense steel works in the short space of time allotted to this trip, was made over the company's own tracks. In this manner, if in no other, the visitors were afforded the opportunity for appreciating the magnitude of this great steel plant.

PROVIDENCE CAR FENDER

The Providence car fender was among the prominent exhibits at the convention. It consisted of the four general types of the company's fenders which are known as A, B, C, and D. Also the Campbell "Snow Broom" and the Millen "Car Step Lifter." These fenders are so constructed as to be easily adapted to high or low cars. One style is designed so as to be adapted to any form of car; another is especially designed for the use of heavy interurban cars. More than 10,000 car fenders of the Providence type are now in use on the principal street railway lines of the world. It is manufactured by the Consolidated Car Fender Company of New York. Mr. John Shepard, Jr., is president and Col. A. C. Woodworth is the general manager.

CHRISTENSEN AIR BRAKE

One of the most interesting exhibits of the meeting was that of the Christensen Air Brake, which is made by the Christensen Engineering Company of Milwaukee, Wis. They had in operation a complete outfit of its automatic equipment, by which the motorman controls the entire train; also, a motor equipment adapted for use on single cars or on cars with trailers. This exhibit attracted the attention of hosts of visitors to the convention. This brake is, perhaps, the most popular one on the market. It is used on the street railway systems of the principal cities of the world. Wherever it has been installed the death rate had been decreased, and it has grown in popularity.

VITRIFIED CONDUIT

The American Vitrified Conduit Company, of New York, had an interesting exhibit. This company manufactures vitrified conduits that are employed for laying wires underground. There is a growing demand for the use of underground conduits throughout the country. Many cities at the present time are discussing the ways and means for laying all wires under ground. By this means it is expected that many lives will be saved and many difficulties removed, not to mention, the improvement in the appearance of the streets which is sure to follow the removal of unsightly poles and wires.

THE SPRAGUE ELECTRIC

The Multiple Unit System of Control adapted to heavy railway service was one of the features of the exhibit of the Sprague Electric Company, of New York. Two complete motor cars of train line equipments were shown. The company demonstrated the working of some of the important features of its exhibit by having the apparatus in active operation.

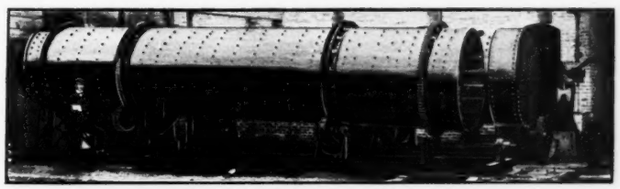
THE GENERAL ELECTRIC

The General Electric Company, of Schenectady, had a commanding position in the center of the main hall directly in the front of the entrance, and therefore came in for a large share of attention. Few booths were as artistically arranged or as complete in their equipment with conveniences for the visiting public. The principal apparatus shown in the exhibit included the following: Alternating Current Switch Board, made for the Manhattan Railway Company; Direct Current Switch Board with current breaker for 25,000 amperes, also for the Manhattan Company; an electrically operated oil circuit breaker for 11,000 volts, of which 154 have been sold to the Manhattan people for controlling their generating station, having a total capacity of 60,000 kilowatts.

These with other minor attractions completed the well arranged exhibit.

RUGGLES-COLES DRYERS

BESIDES designing and constructing all kinds of dryers, used in the cement industry, the Ruggles-Coles Engineering Company, of 39 Cortlandt street, is prepared to take up the matter of drying any kind of material, and, if necessary, will build and design special machinery to suit conditions where its regular standard machines will not be suitable. In writing for estimates, it would be well to give as much information as possible regarding the conditions, such as the amount of moisture contained in the material to be fed to the dryer: the amount of moisture which may be allowed to remain in the dried material, and whether free or combined moisture has to be driven off; also, the amount of dried material required, the amount of heat it will stand without injury and whether it would be injured by the furnace gases. Where possible, it is best to send by express, prepaid, sample of the material, so that it may be analyzed, which will be done free of expense. This enterprising firm of engineers during



THE RUGGLES-COLES DRYER

the past few years has built up an enviable reputation for valuable service and thorough work.

TRADE NOTES

—The C., H. & D. Railway is in the market for an auto car, or any device that will give an independent movement of a passenger car for suburban travel. Address, D. G. Edwards, C., H. & D. Traction Co., Cincinnati, Ohio.

—The Hazelton Boiler Co., formerly of 120-122 Liberty St., New York, has just removed its main office to the works at Rutherford, N. J. Rutherford is only nine miles from New York, on the Erie Railroad, with satisfactory railroad service during the day.

—There were only four American exhibitors at the recent Firemen's Exhibition at Berlin, of which the Gamewell Fire Alarm Telegraph Company, of New York, was one. This well-known company was awarded a gold medal, the only one in its line of exhibits.

—The Sprague Electric Company recently held its annual meeting and re-elected the following officers for the ensuing year: John Markle, president; Edward C. Platt, first vice-president; Allan C. Bakewell, second vice-president; Harry R. Swartz, secretary and treasurer.

—The "Four Track Series" No. 11, under the editorship of General Passenger Agent George H. Daniels has just been issued. It tells an interesting story about the race with the Australian-London mail and how, under the American flag, mail can now be carried from Sidney to New York.

—The Monarch Fire Appliance Co., originator and sole manufacturer of "Kilfyre," the well-known dry powder compound fire extinguisher, is naturally elated at having received the highest award in their class at the Pan-American Exposition. This award appears in the official list which was promulgated October 10th.

—The C., H. & D. Railway Company has placed additional orders with the Barney & Smith Co., at Dayton, O., for 250 seventy-thousand capacity box cars. This completes orders for 750 cars, 300 of which are being built by the Barney & Smith Co., and 250 by the American Car and Foundry Co., at Detroit. The cars will be delivered prior to January 1, 1902.

—The Christensen Engineering Company, of Milwaukee, Wis., has recently received large orders from the Buffalo Railway Company, the Chicago City Railway Company, the Union Traction Company, of Philadelphia, and from Pittsburg, McKeesport, Connellsville and many other cities, for its celebrated air brake. Orders have also been received from South Africa, Australia and Mexico.

—The "Quick-as-Wink" hose coupling, which is manufactured by the W. J. Clark Co., of Salem, O., was on exhibition at the Firemen's Convention recently held in Philadelphia, and was decidedly an eye-opener for many of the delegates in attendance. The coupling was shown in practical use and convinced all who saw it that it could not be broken, although submitted to the severest usage.

—The Eureka Fire Hose Co., 13 Barclay street, New York City, has been awarded a gold medal at the Pan-American Exposition, covering its celebrated brands of fire hose, "Eureka," "Paragon" and "Red Cross," also for hydraulic hose for all purposes, linen hose and tubular fabrics. There is no question as to the popularity of the company's products and the award will be recognized as one that is well deserved.

—The Christensen air brake is used in all the great cities of the world and in many of the small ones. The company has recently issued a statement which shows the number of equipments that have been delivered and the name of the street railway purchasing it and the city in which it is used. Its use is almost universal. A copy of the catalogue can be had for the simple request, sent to the Christensen Manufacturing Company, Milwaukee, Wis.

TRADE PUBLICATIONS

—In a 20-page pamphlet, with a handsomely printed cover, the Conover Manufacturing Company, of 26 Cortlandt street, New York, tells all about the "Conover" Air and Circulating Pumps and Jet Condensers. Many facts are put into a small space, and fine engravings are used freely. Those interested should send for a copy.

—Hundreds of hotels, manufactories and others are now using the Harris system of modern fire appliances, the principal one of which is the "Harris Fire Escape." The manner of utilizing the escape is graphically told and illustrated in a 24-page pamphlet with cover, recently issued by the Harris Safety Company, St. James Building, New York.

—The Standard Silica Cement Company, manufacturers of "Sandcement," of 66 Maiden Lane, New York City, has just issued a beautiful 24-page catalogue descriptive of its Silica-Portland Cement. The catalogue contains some important tables showing various tests, besides other information which will interest city engineers. It is profusely illustrated showing work in which its cement has been used.

—The Ransome & Smith Co., of 17-19 Ninth street, Brooklyn, N. Y., tells how the Ransome patent concrete mixer "mixes cheaper, mixes better than any other mixer" in a 20-page illustrated catalogue just issued. Besides a lot of facts it contains a lot of letters of recommendation from those who have used the mixer. It would not be a bad idea for city engineers and those interested to have a copy.

—In a catalogue of 148 pages, the American Cement Company of Philadelphia, Pa., gives a large amount of information, chemical and otherwise, about the various kinds of Portland cement. It is really a history of the Portland cement industry and is prepared by Robert W. Lesley. It contains numerous tables showing the results from standard tests and is beautifully illustrated. It is a book which will interest every city engineer.

—In a 22-page catalogue, the Ruggles-Coles Engineering Company of 39 Cortlandt street, New York, gives a full description of the Ruggles-Coles dryers. This well-known company of consulting and contracting engineers is prepared to undertake the installation of

complete steam and electric plants, boilers, stacks, tanks, plate and cast iron work. The designing and building of special machinery, and drying machinery of all kinds, a specialty.

—The Sprague Electric Company, of 527 W. Thirty-fourth street, New York City, has recently issued pamphlet No. 501. It contains 24 quarto pages, bound with a handsome cover. An interesting story is told about the Sprague Electric Company's Multiple unit system of train operation. Illustrations are used freely, and in this case they tell a story that it would be difficult for words to express. A copy of this interesting pamphlet can be had for the asking.

—In a 32-page booklet, with handsome cover, on which is printed an engraving of the acetylene gas building at the Pan-American, Elias A. Long tells the "Story of Acetylene," the new illuminating gas which is attracting such widespread attention. This booklet contains a large amount of information which cannot fail to interest municipalities and also individuals who have large or small houses to illuminate. A copy can be secured by applying to the Union Carbide Co., at New York or Chicago.

—A large 48-page catalogue, with a cover which is a fac-simile of an account book, handsomely illustrated, has recently been issued by the Fisher Book-Typewriter Company. The general offices of this company are at Cleveland, with branch offices in New York and Chicago. The pamphlet describes the advantages of using the Fisher billing, tabulating, book recording machine. City clerks and others who are interested in record keeping will be pleased to examine one of the Fisher catalogues, which can be had for the asking.

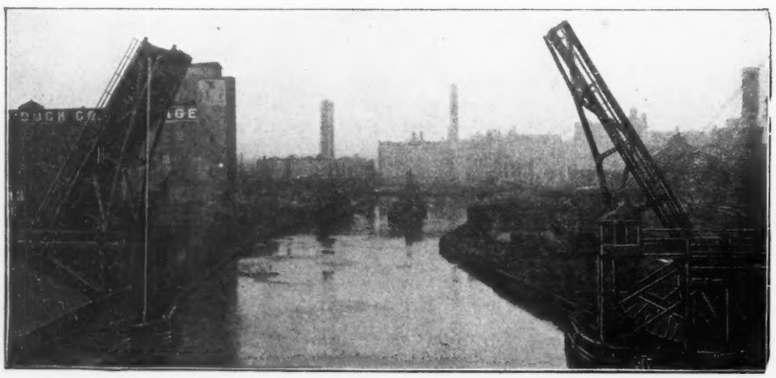
—The catalogue illustrating and describing the Metallic Library Furnishings made by the Art Metal Construction Company, of Jamestown, N. Y., is a work of art in itself. In the paper employed, the letter-press, and the engravings, exquisite taste has been shown. As a whole, this catalogue tells a most interesting story, one that cannot fail to rivet the attention of any librarian into whose hands it may fall. Those who have anything to do with the construction, equipment or administration of a public or private library will find it to his advantage to secure a copy of this beautiful catalogue.

—Wherever, in the cities of the world, is found the electric street railway will also be found the celebrated air brake made by the Christensen Engineering Company, of Milwaukee, Wis. This company now has branch offices in London, Brussels, Paris, Berlin, Sidney, New York, and in fact in all the great centres of population in the world. A beautifully illustrated catalogue recently issued by the company gives a list of the total number of equipments that have been supplied to the leading street railway systems. The subject matter of this catalogue will interest the progressive city officials of our country.

—Every city of any size is vitally concerned in the crusade against the smoke nuisance, for this reason mayors, councilmen and health departments will be interested in the illustrated catalogue of the Under Feed Stoker Company, Marquette Building, Chicago, Ill. It describes the stoker, tells about its operation, cost, simplicity of construction, and how to save fuel and prevent smoke. A large amount of interesting data relative to the economy of using the Jones Under Feed Stoker are included in this catalogue. It will be sure to interest any one who is concerned in abating the smoke nuisance or in fuel economy.

Julian Scholl & Co., of 126 Liberty street, New York, in catalogues numbers 8 and 9, which are profusely illustrated, tell all about asphalt rollers and stone crushing machinery. Everybody is interested in good roads nowadays, and therefore it will be of value to city officials particularly, to send for these catalogues. In a beautiful booklet of 22 pages, which is well illustrated, this same company describes the roller which is made to use in maintaining golf links, either public or private. By experiment it is found that an ordinary roller is not the one to use for golf links. Those interested should secure a copy of this catalogue. The Park Department of the city of Boston has had one in use for some time. In this company's illustrated general catalogue, which contains 70 pages, all kinds of road builders, street pavers, and, in fact, everything which is used in the construction and maintenance of streets, roads, sewers, etc., by general contractors or municipalities is mentioned, with prices.

Proposal for Water Supply, City of Jacksonville, Morgan County, Illinois. Proposals are invited from Syndicates or reliable companies to furnish the City of Jacksonville with good, wholesome water supply. Address correspondence to S B. STEWART, City Clerk.



Taylor Street Scherzer Rolling Lift Bridge, Chicago—Open.
Invented by WM. SCHERZER, C. E., Patented.

Twenty-seven other large Scherzer Rolling Lift Bridges in successful use and under construction at the present time.

The Scherzer Rolling Lift Bridge forms an artistic and pleasing structure and fulfills every modern requirement of a movable bridge.

Preliminary Sketches and Estimates furnished to responsible parties upon request, accompanied by the necessary data.

The
Scherzer Rolling Lift Bridge Co.,
1616 Monadnock Block, Chicago.